THE NATION

January 4, 1964 . . 35c

THE ABACUS and THE ROSE

A Dialogue after Galileo

By J. Bronowski

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LETTERS

Trained to kill

Cambridge, Mass.

Dear Sirs: In *The Nation* of Dec. 14, Robert S. Hirschfield writes ("Unprecedented Succession"): "It is even possible that the murder of a President will calm the atmosphere of violence which has gripped the nation for the past year."

I could not disagree more. First of all, it is not merely "the past year" that has witnessed the build-up of violence in this nation. Ever since World War I, when conscription of our youth began, there has been a steady rise in violence and anarchy. As a Christian minister I have witnessed the steady destruction by our federal government of moral values instilled into youngsters by church and home. I did not know President Kennedy personally, but I would guess that he frowned upon the idea of the Pentagon's taking boys who had been taught to "love one another" and training them instead to hate and to kill other people. It is ironical that one boy so trained by the Pentagon should have been the killer of the Commander in Chief of our armed forces. . . .

We are witnessing two powerful organizations, the armed forces and the church, working at cross purposes in training our youth. Is it any wonder that part of the end product should be mentally and emotionally unstable men, easily persuaded to become criminals and murderers?

J. Ernest Bryant

The assassination

Chicago, Ill.

Dear Sirs: The Dallas police have from the start shown too much interest in proving a particular set of facts. Their orientation and background would probably make it difficult for most to be really objective. How much more can we expect from the FBI? Are the FBI men working on the Texas area investigation—or any of the investigators—men who grew up in the South? It is unfortunate that in appraising the work of an FBI man one must first ask, "What is his background?" But when the President has been assassinated, that question surely must be asked and answered before the findings presented to us can be properly appraised.

Jesse L. Lawver

'Not as deep'

Berkeley, Calif.

Dear Sirs: Friday, the 13th, seemed an appropriate day for our Defense Department to announce the letting of contracts to make deadly darts "capable of inflicting gaping wounds almost as severe as that caused by a dum-dum bullet. . . ." Ironically, this weapon is not prohibited by the Geneva Convention against the dum-dum bullets, the Defense experts say, because the wound, while similar, is "not as deep!"

I am now waiting for toys to be made—say, Torture Kits for Tiny Tots, so that our children may be trained early not to be squeamish when they grow up to "inflict gaping wounds."

We trust the American public will feel as outraged as we do over the immoral indecency and that an avalanche of protest may be sent to the Defense Department. MERRY CHRISTMAS!

Emma L. Packard
Walter Packard

Czolgosz

Stanton, Minn.

Dear Sirs: I was just a small girl at the time of the assassination of President McKinley. A great hullabaloo was raised about the terrible anarchist Czolgosz who had shot him. As I remember it, feeling was aroused to such a pitch that the body of Czolgosz was placed in a bed of quick lime in the grave. Just this week the columnist Raymond Moley refers to Czolgosz as an anarchist. Now, as I understand it, all later careful students and reliable historians have called Czolgosz a slightly cracked office seeker who did not get a job he wanted. A Republican too! What I want to know is how the press was able to build up all this hysteria about anarchists—when all the objective evidence was quite otherwise. I believe there may be a valuable lesson for us in this.

Marion Robbins Thompson

Ellison's 'quaint' ideas

Philadelphia, Pa.

Dear Sirs: In simple form, Ellison's "Our Quaint Political Folkways" (*The Nation*, Nov. 16) presents a two-part argument: (1) The condition of education, air pollution and the like is Bad, and we should make it Good; (2) to do this we must expand the power of the state. The first, however, offers little basis for analysis; all would agree to the safe proposition that we should try to attain Good—but it is not clear that any political proposals necessarily follow from this proposition. . . . Though one would hope political thought will be moral, moralisms should not be sloughed off as political thought.

The real problem lies in Ellison's refusal to come to grips with the main issue, though he alludes to it in passing. He asks in connection with automation, "How can you keep a society happily, creatively and profitably occupied when 20 per cent of the labor force can do 100 per cent of the work?" This question is not restricted to the phenomenon of automation alone. Putting aside what he means by "creatively" and "happily," the key word here is "profitably." For our real problem is how, in a system that is run almost solely for the profit of a few, social reform which that few does not deem profitable, can be brought about. It is *this* question which is at the root of much of today's political thought, but until we deal with it directly we will have to remain content with confused and rather slapdash treatments such as Ellison's.

Robert Cammer

Washington, D. C.

Dear Sirs: I hope Jerome Ellison's article will be reprinted by the millions and get into the hands and minds of our people. . . .

Isaac B. Simon

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Johnson As Tactician

Every Secretary of Defense since James V. Forrestal, every President since Harry S. Truman, has been perfectly aware that a certain number of Army and Navy bases in the continental United States had little or nothing to do with defense. These bases were and are essentially pork-barrel projects, providing government jobs (in private industry that's called featherbedding) and injecting spending money into the local economy. No one was more eager to shut down these otiose installations than President Kennedy and Defense Secretary McNamara, but the political consequences were so terrifying that action was repeatedly stalled. Now, by as adroit a maneuver as Washington is likely to behold, President Johnson has gone and done it — and got away with it.

It is only a start, of course — but activities at thirty-three military installations, twenty-six of them in the United States and seven abroad, will be discontinued or curtailed. Each of the twenty-six is in a Congressional district, and the screams of agony from wounded Representatives and Senators were calculated to curdle the blood. Some mitigations resulted in the naval cuts, but Mr. Johnson's blood does not curdle easily. He pointed out blandly that on the national level businessmen were calling for economy, defense accounted for more than half the budget, and among 6,700 defense installations, about two-thirds of them in the U.S., many were no longer needed. (Many of them never had been needed — for defense, that is.) And, it was unnecessary to add, you want that $11 billion tax cut, don't you?

It took a certain amount of courage, just the same. A cardinal rule of politics was violated. Al Smith said it first: "You don't kill Santa Claus just before Christmas." Rep. John J. Rooney of Brooklyn, himself of good heart since the New York Naval Shipyard was spared, repeated the maxim and said he still thought it was bad politics. The chances are that when the clamor dies down it will be found to be good politics. A certain number of legislators, tavern keepers, supermarket owners, et al., have been hurt. But the big corporation executives, from whom campaign funds flow, are pleased. So are many small taxpayers who received no personal benefit from the bases and knew perfectly well that they were paying for their maintenance. One may also assume that a substantial number of voters dislike the idea of the government's acting as a hiring hall for useless employment, and like it even less when it is done in the guise of defense.

If McNamara has his way, another 130 to 150 installations will be shut down, and some of these may be really big spenders like naval shipyards and SAC bomber bases. Congressional caterwauling will be even louder in the future, and many staunch legislators who are complacent today will be dying tomorrow. But the logic is ineluctable. As McNamara pointed out in November, while President Kennedy was still alive, the United States is invulnerable. We already have 500 operational long-range ballistic missiles and are rapidly adding another 1,200. In almost all other military departments the country is proportionately equipped. Gross obsolescence cannot be tolerated indefinitely in a complex so huge.

But what of the people who are to lose their jobs? The fact is that the government will be far more humane than many corporations which are forced to retrench. The cutback is to be spread over forty-two months, some workers will merely be relocated (at government expense). If it should turn out that the economy is so misshapen that the great military boondoggle is the only way to keep America employed, we might as well face it now as later.

In the meantime, President Johnson has succeeded in implanting the desired image of himself — the safe, sound, sober President who can be relied on to spend the taxpayers' money wisely. He can now increase the budget by a couple of billions —one hopes for useful purposes — and still appeal to the safe, sound, sober voter. Suddenly *The Nation*, which has been trying since the end of World War II to break up the deadly cold-war coalition of interests, is joined by *The Wall Street Journal*, which in ringing tones declares: "Weapons and the facilities they require are not productive assets which add to economic strength." In this light, Mr. Johnson does not look bad at all.

Not Enough

"To the best of my knowledge," says Prof. John Kenneth Galbraith, "there is no place in the world where well-educated people are really poor." He therefore proposes that poverty be attacked by providing the nation's 100 poorest counties or urban slum districts with the finest schools obtainable. The districts may queue up on the right, the poorest 100 will be selected. Magnificent educational facilities will be installed (cost no object), the best teachers will flock to them, and in a generation or sooner the people will see a miracle and follow suit all over the country.

It will not be that easy. The effects of poverty cannot be alleviated in the schools alone. Many a child, when he enters school, is already disqualified by his experiences, and the experiences of his parents, from succeeding. Professor Galbraith does, indeed, propose to include "modest" education grants to families to feed and clothe the children for whom there will be such a grotesque contrast between school and home environments. But by all indications much more radical measures will be required to cure the American disease of poverty in the midst of plenty.

One trouble is the sheer size of the problem. According to the latest figures, 20 million Americans —

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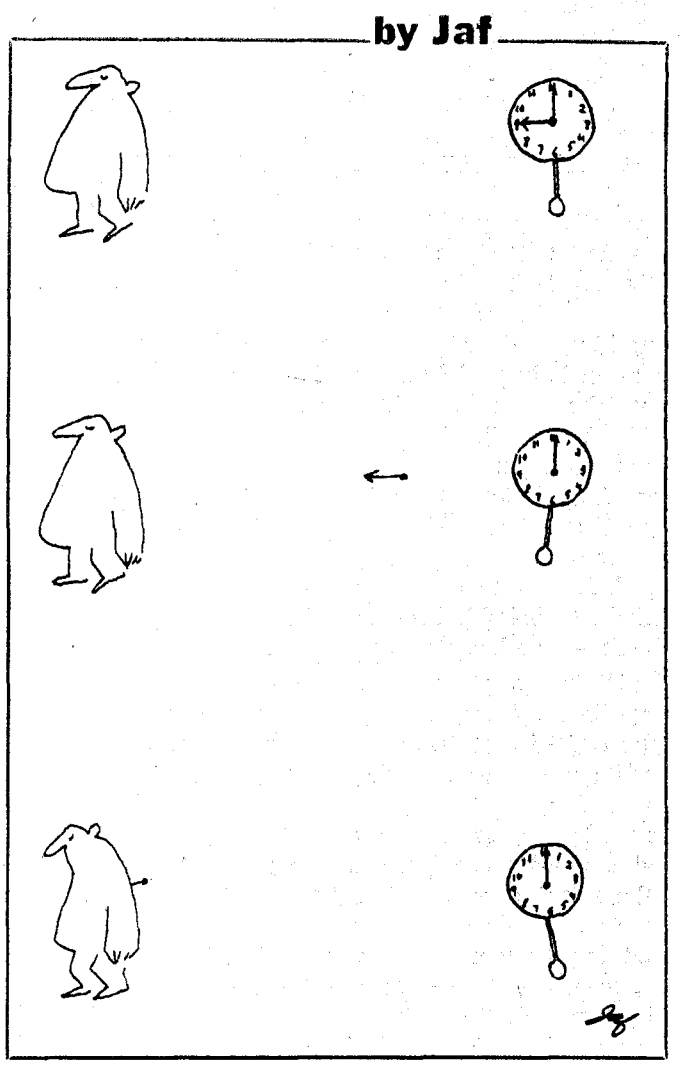
one in ten — exist in such "abject poverty" that they lack even bare necessities, and the affluent section of the nation cannot even imagine the condition of these fellow countrymen. Another 26 million live at "minimum adequacy" levels, adequacy, in this context, being an elastic term. It adds up to one out of four Americans living in poverty. Superb educational facilities in 100 localities will not make much dent in a condition so widespread.

It must also be realized that ignorance and discouragement are as prevalent as poverty. Those who can, try to get away from all three. With all its resources, West Virginia is one of our poorer states, and the best educated West Virginians choose to leave West Virginia. President Paul A. Miller of West Virginia University (*Charleston Gazette*, December 13) pointed out that the state is "a supplier of talent for other places. . . . It is my judgment that the deepest economic crisis of West Virginia will be, if we are unable to prevent it, the permanent drain of intellect to other areas." You may not appreciate your intellectuals while they are around, but you will miss them when they are gone. Dr. Galbraith's centers of poverty and good schooling will have a hard time keeping the cream of their educational product.

One commentator on the Galbraith proposal likened it to dumping a few shiploads of bright young men in, say, Kenya, with no funds, no plant, no equipment, no capital. Their education could not be applied. Gunnar Myrdal was probably closer to the solution when he told the Senate Subcommittee on Employment and Manpower that there had to be more government spending in the blighted areas, even if it could not be done in a better way than scattering dollar bills from airplanes. In relation to the race problem, Myrdal warns his American friends that "when the horses have nothing to eat, they bite." But the warning goes beyond race. America may be able to exist three-quarters well off and one-quarter poverty-ridden, but that quarter can in the end demoralize the rest. Education, spotted here and there, will not avert such an outcome which, whether it comes or not, is surely what we deserve.

The Sad Sack Agency

The Federal Communications Commission is the sad sack among the regulatory agencies — not that any of them are models of deportment or efficiency. It is peculiar, just the same, that the FCC should limp so badly, for on the letter of the law its position is the strongest. It is legally obliged to issue and renew licenses for radio and television solely on the basis of "the public interest, convenience and necessity." Not a few commissioners and FCC employees have taken this Congressional directive literally, yet broadcasting gets worse and worse. FM, for example, which was to give the public some decent radio fare and a choice of program material, is now almost as grossly commercialized as AM, and the networks simply duplicate their programs in the two media. As for TV, the commercials are so long and frequent on most network



programs that only children and totally undiscriminating adults find much worth listening to.

One reason for this state of affairs is that so many Congressmen own interests in broadcasting stations that the FCC is afraid to assert itself. What Congress has given by statute it takes away, quite effectively, by influence. Another factor is that in the networks the FCC faces one of the most resourceful and effective manipulatory outfits in the entire complex of American business. The way it functions is well illustrated in the current FCC hearings on a proposal to limit the number of commercial announcements.

First, the forehanded broadcasters provide themselves with a code of ethics, formulated in this case by the National Association of Broadcasters. Behind this shield of virtue the networks and outlet stations then do as they please, i.e., they pack the programs with as much commercial time as they think the majority of viewers and listeners will tolerate. The code is generally ignored, but it serves its purpose of deceit and obfuscation.

When the industry is called to account, as in the present hearings, its friends resort to still further dust-throwing and smoke-screening. One big-shot advertising man testified that it was not the length and frequency of commercials that irritate the customer,

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but "clutter," which he identified as public-service announcements, station identifications, show credits and interruptions generally. Actually, these interludes are unobjectionable, while commercials, in contrast, force their message on the audience by every device known to the advertising psychologist.

Another maneuver is to roll with the punch. It is just possible, the commission is told, that something should be done about over-commercialization (in the rare cases where it exists), but whatever action is attempted must be on an individual, station-by-station basis. That is, there must be thousands of hearings, each of which can be prolonged indefinitely. What the commission must *not* do is to issue a general regulatory rule, and the only effective action is thus barred. The industry will stand as one man against it in the Congress, and, if the commission won't play ball, in the courts.

And as further insurance, should moderate methods fail, the industry employs the blockbuster. Even as the hearings were in progress, the House Commerce Committee approved a bill forbidding the FCC to prescribe any curb on commercials. Everyone in the industry, like everyone on the commission, knew what this meant. Regulatory agencies do not generally defy the Commerce Committee, which in effect regulates them. Thus the broadcasting industry has once more demonstrated its power to defy good taste and common decency. By all indications, it will take more than the FCC to bring it to book.

The Nation's press run begins each Friday at 12 noon. The magazines are bound on Monday and the first lot is distributed to newsstands in New York City the same day. On Tuesday, the magazines are mailed to subscribers and to newsdealers throughout the country. Most subscribers in the East receive the magazine by Thursday, and those west of the Mississippi a day or two later. The same applies to the newsstand dealers, some of whom do not receive the magazine until Thursday or Friday of the week of publication. These dealers offer the magazine for sale on the newsstands the week following its appearance in New York City. To accommodate these newsdealers, we advanced the publication date by one week, beginning with the June 1-8 issue.

This change in our practice has caused a considerable amount of confusion; it was particularly noticeable when the tragic events of November 22 were discussed in an issue dated December 14. Accordingly, we are, with the next issue, moving back the publication date five days; from then on, issues will carry a Monday date. This Monday date represents the end of the period when the issue is on sale in New York City and nearby communities. We hope that newsstand purchasers on the West Coast, in Hawaii, Alaska, Canada, etc., will realize that the magazines they are purchasing are not out of date, although they are on sale for a week after the cover date.

Justice for Captain Kauffman

The most cheerful item of Christmas news received at *The Nation* this season was the decision of the United States Court of Military Appeals (December 13, Case No. 16,824) to dismiss two of the three charges against Captain Joseph P. Kauffman (conspiracy and agreeing to act as an East German agent). As to the third charge, which Captain Kauffman never denied — failure to report contacts with foreign agents — the court returned the record to the Judge Advocate General of the Air Force, where a rehearing on sentence may be ordered or a board of review may reassess the sentence on the remaining findings. The Judge Advocate may well decide that the two years and two months which Kauffman has spent in prison while his case was under review is more than adequate for this minor offense.

Nation readers will recall, from Fred J. Cook's moving account of the case ("The Ordeal of Captain Kauffman," September 14, 1963), that Kauffman was originally sentenced to twenty years on the three charges. Of more general importance than the victory for Kauffman and his counsel, George W. Latimer, is the remarkable language used by the court in denouncing the violation of Kauffman's basic rights. In words reminiscent of Holmes and Brandeis, the court lambasted the tactics used by the Air Force investigators in the arrest and trial of Kauffman. It found, for example, "massive and deliberate violations" of his "constitutional rights . . . during the course of the investigation by the Office of Special Investigations," and then went on to add this significant comment: "Paradoxically, such violations are admitted and not denied." The violations — all pinpointed in Cook's article — concerned such matters as searching the Captain's apartment without a search warrant, eavesdropping on conversations with his lawyer, and "signaling" to witnesses during his hearing. "We are amazed," the court states in its opinion, "that in the second half of the twentieth century a colonel, Judge Advocate, should admit a system of signals in a courtroom in connection with the trial of a serious criminal matter." In summing up its view of the illegal tactics used to secure Kauffman's conviction, the court makes this statement: "The protections of the Bill of Rights are not reserved for those never suspected, charged or tried for criminal violations. Indeed, persons of such rectitude have scant need to call upon those protections. We regret that we cannot call to our command words in which we can adequately condemn the illegal procedures revealed by this record." Not only is the decision a stirring vindication of Captain Kauffman — a man who had served his country loyally and well for many years — but it sets a high standard of ethics and eloquence for future military trials. The reversal, finally, is a remarkable tribute to the skill and insight of a fine reporter, Fred J. Cook, whose account of the case in these pages elicited strong editorial commendation here and abroad. The power of the printed word may have been debased in our time, but there is still no substitute for it.

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THE ABACUS and THE ROSE

A Dialogue after Galileo

By J. Bronowski

A NOTE ON THIS ISSUE

At Christmas time in 1956 *The Nation* devoted a special issue to J. Bronowski's *Science and Human Values*, an essay which immediately took, and has since held, a leading place in the intellectual dialogue of our time. The issue itself was far oversubscribed; the essay was published here in both hard cover and paper editions (Harper Torchbooks) and is even today selling at a rate of 1,000 copies a week; in England, *Science and Human Values* has recently been added to the Penguin library after a most successful sale in the hard-cover edition.

Meanwhile, the problem whose dimensions Mr. Bronowski was the first to define has been impressed ever more acutely on the public mind, both here and abroad. It was given its name, The Two Cultures, in a celebrated monograph by C. P. Snow, and its implications have been traced in government policy, educational practice and in the creative and critical documents of the time.

Accordingly, Mr. Bronowski now returns to the theme in a more sharply focused and dramatic form. The three-sided conversation here presented is modeled by him on *Dialogue on the Great World System*, a work for which Galileo was condemned by the Inquisition in 1633, and which the Holy Office kept in the *Index* of forbidden books for another 200 years.

"That was the most tenacious rear-guard action," writes Mr. Bronowski, "that has yet been fought by traditional belief against the rise of science. I wrote my 'New Dialogue' in order to make concrete the same battle, which is being fought as bitterly today between established tradition and the headstrong, creative spirit of science."

Mr. Bronowski supposes that his three characters (they are identified in a neighboring box) are attending an East-West conference on some cultural matter at Lucerne in Switzerland. Sir Edward St. Ablish, senior member of the British delegation, has invited his mutually hostile junior colleagues to dinner, in the hope that he can appease their discord at least sufficiently to maintain a show of English harmony at the conference table. By this device, the author brings into relief an aspect of the Two Cultures debate that has been little considered before. The protagonists in the great schism of this generation are not only champions of different (or seemingly different) values; they are also men who, by instinct and training, display sharply clashing personalities. Being a poet as well as a scientist, Mr. Bronowski makes vivid his insight that the resolution of this human incompatibility is at least as vital a good as the definition of an encompassing intellectual and moral program.

THE EDITORS.

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THE DIALOGUE

SIR EDWARD: I telephoned for this table because I remembered the sunset. Professor Potts, you must sit here, on my right, where the view is best. . . . Will you take the other side, Dr. Harping? And move your chair around a little, do; you must see the sunset. That is what I brought you for, both of you.

HARPING: Sir Edward, you said that all the way up in the train. The view is fine here; do I have to crane my neck at it all the time? Why do people with knighthoods always behave as if they had personally arranged the sunset?

SIR EDWARD: Come, Dr. Harping, that is not worthy of your wit. I did not arrange for the sun to set. But I did personally arrange for you to be here when it did set.

POTTS: Bravo, Sir Edward. And that, my dear Harping, is called administration.

SIR EDWARD: Indeed it is, Professor Potts: administration. And I am proud to put it to the service of the sunset. Isn't it beautiful? That glow of flaming red on the snow, and then the hard scarlet flash behind the peaks.

HARPING: Huh!

SIR EDWARD: Do back me up, Potts. These literary men no longer care for beauty.

POTTS: You put me in a false position, Sir Edward. Not appreciating the beauty of the Alps is an old story, you know. Samuel Butler tells it.

SIR EDWARD: Really? I didn't know.

HARPING: Oh Potts, not that Victorian chestnut.

POTTS: A friend of Butler's praised the scenery to a Frenchman who was staying in the same hotel. The Frenchman said politely, "Oh, do you like the beauties of nature? I detest them."

SIR EDWARD: I see I am in for a difficult evening with the two of you. I brought you here to ask you to be nice to each other. I hoped you'd find some common ground.

HARPING: We have a common ground, Sir Edward. We like being beastly to you.

SIR EDWARD: I won't listen to you, Harping. I am about to order you a glass of sherry. I shall order the sherry that I like; kindly have the grace to like it too. And do not read me a sermon on the evils of alcohol, either of you.

HARPING: Potts, I want to ask you a question. If the sunset leaves you cold, why don't you say so? Why do you need Samuel Butler to give you courage?

POTTS: Because Samuel Butler is a hero of mine. He was full of fancies and he quarreled with Darwin, but he had an interesting mind.

HARPING: Nothing about his story is interesting. He wasn't even the one who detested nature, remember? It was the Frenchman. You just drag in Samuel Butler because you want literary support. Why? You're supposed to be a scientist. Why this parade of the well-read, well-thumbed literary sources? These are tid-bits that my first-year students know, even if Sir Edward doesn't. You don't need to show off that you know them too.

POTTS: Of course not, Harping; I don't show off. I am simply used to quoting my sources. If Samuel Butler made the original observation, then I quote Samuel Butler. And he was a most original observer, you must agree.

HARPING: He was not. He was an eccentric, so you think he was original. That's the judgment of science. And he disliked authority, so you quote him as an authority. That's the scientific attitude. And really, it's so terribly literary — like Latin tags and stories about Dr. Johnson. You know, Samuel Butler had a passion for new-laid eggs. I shall avoid having breakfast with you, Potts, for fear that you will feel it necessary to bore me with his example in order to justify your second egg.

SIR EDWARD: Here's the sherry, gentlemen, and please drink it temperately. It's a triumph to get sherry before dinner in Switzerland—yes, I know, Professor Potts, a triumph of administration.

POTTS: A triumph that I appreciate, Sir Edward.

SIR EDWARD: I am sure you were glad of the diversion, Potts. All the same, Harping, I don't think you were fair. Why be cruel to Potts's heroes? You have your heroes too, I remember; I have heard you being very tedious about D. H. Lawrence — and at breakfast, too. Is there anything to choose between them? Butler the shy eccentric of the head, and Lawrence the stern eccentric of the heart. Admit it, Dr. Harping; the heart has its unreasons too!

HARPING: Sir Edward St. Ablish, are you seriously suggesting that the profound and professional craft of D. H. Lawrence is to be compared with the dilettante talents of —

The Cast

SIR EDWARD ST. ABLISH represents the Establishment: urbane and maddeningly tolerant, fifty-five-plus, Deputy Secretary to the Ministry of Education (or the like), acquired Oxford voice with Edinburgh base.

DR. AMOS HARPING represents the literary furies, something between *Scrutiny* and Jimmy Porter: a puritan anger, but bitter because he feels helpless in a changing time — about thirty-five, Reader in English at Southampton, say, Midland voice of preacher with cutting edge.

PROF. LIONEL POTTS, FRS, represents science: a little smug, because success came young, and slow to see that there really are other points of view (and interests) than that of the molecular biologist—not yet forty-five, lacking the critical gift of the other two, his sense of mission as sharply positive as theirs is negative, Irish voice smoldering with idealism.

J. Bronowski, Polish-born and a resident of England since 1920, is both scientist and man of letters. He is director of the Coal Research Establishment, has lectured at M.I.T., is the author of The Common Sense of Science: *he has also written* The Poet's Defense, William Blake: A Man Without a Mask, *and a number of radio plays, among them the celebrated* Face of Violence. *In the very near future, Mr. Bronowski is resigning his post with the National Coal Board to take up residence in La Jolla, California, as one of the fellows of the new Salk Institute for Biological Studies.*

The illustrations for this issue, exemplifying fifteenth- and sixteenth-century preoccupation with science and the humanities, were supplied by the New York Public Library.

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SIR EDWARD: Please don't get up, Dr. Harping; there is no train back for some time. I am suggesting that *The Way of All Flesh* is a novel of the same excellence as *The White Peacock*, certainly. But you miss my point if you turn it into an argument about literary merit.

POTTS: And what is your point, Sir Edward?

SIR EDWARD: My point, Professor Potts, is that you both need heroes, Dr. Harping and you. Harping has been scolding you because you cannot be unconventional on your own two feet. You have a solemn convention for being unconventional — it's the scientific convention. But Harping has his own convention, too, for being unconventional. He takes his tie off when he lectures; and I dare say you have some trick of stripping off your white coat in times of drama in your laboratory. You pioneers have to be so individual, both of you. Harping has to look like his teacher — what's his name? — Dr. Leavis; and you have to look like an Irish groom.

HARPING: I don't deny that, Sir Edward, and it's not very deep. We all have our patterns. Of course we do. Potts has his kind of nonconformity, and I have mine. And you have your cozy conformity — *you* can dispense with heroes. But I wasn't taxing Potts with following a pattern; I was criticizing the particular pattern that he follows. It's such a literary and derivative pattern. Why call yourself a scientist and then fill your mind with a ragbag of nineteenth-century sentiments? Is that supposed to be a union of two cultures? You don't know what literature is about, Potts. Culture, indeed; all you collect is a string of cultured pearls.

POTTS: I really don't see your evidence for that, Harping. Do you always get carried away by one example? We were asked, both of us, if we thought the sunset beautiful. You don't like my answer. Very well, let me hear yours. I notice that you have avoided saying anything yourself. Do you find the sunset beautiful?

HARPING: You can't be serious. You don't really expect me to talk about beauty in sunsets, do you?

POTTS: Why not?

SIR EDWARD: Why not, indeed, Dr. Harping? I asked the question, and certainly I expect a serious answer. Here it is, the last of the sunset glowing over the Alps. Rose red of snow on crimson and vermilion over gold. In ten minutes it will be gone; and in half an hour it will be dark. It's a symbol of our conference: the West being drenched with red and after that, darkness. It deserves your attention, Dr. Harping, surely; I wish I could get you to give it your joint attention, both of you. So, in all seriousness, I should like to have your reflections on the sunset, Dr. Harping.

HARPING: But how can you ask such a question? It doesn't make sense. Is the sunset beautiful? What a word to use! The sunset isn't an object like a coin, and beauty isn't a value that's been stamped on it, officially: one sunset, mint condition, like a half-crown.

POTTS: You're always protesting, Harping. Here you are, full of scorn, telling us what the sunset is not. All right, I know what the sunset is not. It's not a half-crown, and I never thought it was. And I did not ask you what the sunset is not. Just tell me what it is. Tell me if it's beautiful, and why.

HARPING: But the question doesn't mean anything, Potts. I'd rather not have used words like beauty; but if that's the word we want to use, very well. Beauty is not a currency; it can't be passed from hand to hand at an agreed value; and it certainly is not absolute by nature. Beauty is a personal relation; something that the sunset says to me, or doesn't say; and that I can then discuss with you, and shed light on for you, and you for me. But I cannot hand it over to you as a finished judgment. I can hand you a copy of *The White Peacock*, Sir Edward, but I cannot hand you its greatness. You can arrange for me to see the sunset, but you cannot arrange for me to see its beauty.

SIR EDWARD: I understand that, Dr. Harping, and if I may borrow your phrase, it's not very deep. You have something deeper to explain to me: why what the sunset says to you and what it says to me cannot be contained in a common description. Beauty is not absolute by nature, you said — I think you said "certainly," as people do when they want to avoid discussion. Did you say "certainly"?

HARPING: I have no doubt I did.

POTTS: He would prefer you to accept the proposition as self-evident rather than as reasonable.

SIR EDWARD: I do not think that beauty is absolute either, Dr. Harping; I have learned that it is not, by experience. But I should like to have the proposition discussed. It would make an interesting session of the conference: more interesting than all the talk about culture and democracy. How we chew those two words, culture and democracy, like two fried eggs — do you prefer them Western style, sunny-side up, or simply turned over, Eastern style? That reminds me, I have ordered you an hors d'oeuvre. It's very Swiss, I'm afraid; it has cheese in it. Waiter! We will have the hors d'oeuvre now, and another glass of sherry. Can you bear to agree with the absolute judgment of all wine tasters, Dr. Harping, that this is a beautiful sherry?

POTTS: Harping will tell you that you do not mean the absolute judgment, Sir Edward; you mean the universal judgment. And you do not mean a beautiful sherry, either; you mean a splendid sherry.

HARPING: All right, Potts, tease as much as you like: it still is so. There are things you can say about the sunset which are plain enough, crude enough, to be universal. The sunset is splendid, meaning that (like the sherry) it is full of gold. The sunset is spectacular, meaning that it is more colorful than our daily view of the sky. You can even say that the sunset is exhilarating because it gives all of us a sense of the grandeur of nature which we lack at other times. These are statements which are rough, direct and, at bottom, descriptive. They are essentially statements of fact, which have as their basic point of reference the comonplace conditions of life that we all share.

SIR EDWARD: And yet I must not say that the sunset is beautiful?

HARPING: No, Sir Edward, you must not; you must not, if you want to use words sensitively. Beauty is not measured, like splendor, by a comparison with the commonplace. It is felt in each of us by what is most individual in him. When we discuss

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beauty as we should, we are not looking for common ground, the way you are, Sir Edward, by profession—and the way Potts is always looking for common ground, too, because that's all that scientists understand. My profession is to discuss beauty—if that's the word that we've decided to embarrass ourselves with this evening. And when we in my profession, the critics, when we discuss beauty in a work of art or of nature, we are looking for what is uncommon, what is personal, what we can see and someone else cannot. We are using the occasion, each of us, to search into our own individual gifts of appreciation.

SIR EDWARD: Why? You may be engrossed in your private exercise; but why should I be? Why should I attend to what you, Amos Harping—you and no one else—have to say about a poem or a sunset?

POTTS: He may be a better judge of them than you are, Sir Edward.

HARPING: No, Potts, no, no — or rather, yes and no. Yes I am a better judge because no I am not a better judge—because I am aware that no one is a better judge. Why did you ask me about the sunset, Sir Edward? Do you think me a better judge of sunsets than you?

SIR EDWARD: No, Harping, I do not.

HARPING: Then why did you ask me?

SIR EDWARD: Because I wanted to hear what you would say.

HARPING: Of course; and that is the nature of critical appreciation. You want to hear what I say, not because it is better than what you say, but because it is different—minutely, subtly different, different in this personal foible or in that glimpse of another mind. And these differences, these small flashes of light behind the outline, they illuminate and enrich your own vision. You wanted to hear what I had to say, Sir Edward, because now that you have heard it, you will make it your own—a shift of emphasis, an infinitesimal enlargement of your apparently sacred and settled opinion of sunsets.

SIR EDWARD: Elegantly put, Dr. Harping. I congratulate you; you can be persuasive when you want to be. I wish you would want to be a little oftener in the conference hall; I need your help, both of you, as a matter of British prestige. You know that. Professor Potts, tell me, has Harping persuaded you?

POTTS: He has not persuaded me.

SIR EDWARD: And why not?

POTTS: Because everything he says is obvious, and he makes it seem so elaborate. He says so much, and then it really doesn't mean much. It's all right to call the sunset splendid, but it's not all right to call it

beautiful. Is that supposed to persuade me? Why?

HARPING: Surely I've explained that. "Splendid" is a description, but "beautiful" is a judgment.

POTTS: And am I supposed to be persuaded by those names? Description versus judgment: do you really ask me to accept that shallow distinction?

HARPING: Oh no, oh no, I do not ask you to accept it. Critics know the difference between a description and a judgment, and philosophers know it. Sir Edward St. Ablish knows it. But not you, not Professor Lionel Potts, F.R.S. Because Lionel Potts is a scientist. He does not accept fine distinctions. Lionel Potts sits in his laboratory and peers down his microscope and describes what he sees; and everything that Lionel Potts sees can be described. Does Lionel Potts see the sunset? It can be described. It is splendid—of course it is, because the word means "shining." A good, solid, half-crown word; you can weigh the sunset with it to the nearest gram. That's the way Lionel Potts sees things in the Royal Society. It's a sunset; it's splendid; it's red. What wave length, Professor Potts?

POTTS: Around 7,000 angstroms.

HARPING: The answer of a scholar: around 7,000 angstroms. And the sun is 90,000 miles away—

POTTS: Ninety million miles—

HARPING: My mistake. I apologize for my crass mistake. I'm sure it matters to someone. The sun is splendid, it's setting on a wave length of 7,000 angstroms, which is red; it is 90 million miles away and it weighs—what does the sun weigh, Professor Potts?

POTTS: I don't remember.

HARPING: Never mind, I won't tell the Royal Society. Professor Lionel Potts doesn't know what the sun weighs, but he knows it weighs something. Something exact, to three places of decimals. Lionel Potts knows that everything weighs something. Everything can be measured and photographed and spectrographed and God-knows-what-graphed. That's it; everything in Lionel Potts's world can be graphed—just graphed. Everything can be described. Who would dare to tell Professor Lionel Potts, F.R.S., that beauty cannot be described? Who could hope to persuade him that description is not enough; that life, life outside the laboratory, also calls for judgments? . . .

POTTS: Are you pausing for an answer, Harping? Or are you only pausing for breath?

SIR EDWARD: He is pausing for effect, Potts. But I want to hear your answer.

HARPING: Why trouble him, Sir Edward? Potts is a scientist; why trouble us with his thoughts? He is a man of action—the twentieth-century man of action. He doesn't know what a judgment is.

POTTS: On the contrary, Harping, I don't know what a description is.

SIR EDWARD: What's that, Potts? What did you say?

POTTS: I said, on the contrary, I don't know what a description is. I know what a judgment is; at least, I know when I make a judgment. But I don't know how to make a description—a scientific description, a pure, precise, mechanical description; a description, period, with no judgment in it.

SIR EDWARD: Potts—I would say solemnly Professor Lionel Potts, except that Harping has charged the name with such extraordinary passion—Professor Potts, I do not

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know what you mean and I should like you to tell me.

Please stop for a moment. We are to have trout and Pouilly Fumé. The service is indifferent, but that is the penalty that we pay for being on top of a mountain. I have observed (is that the neutral word I ought to use?)—I have observed that in Switzerland the quality of the service varies inversely with the altitude. Is that a description, in your philosophy, Harping; or is it a judgment? No, I mustn't be trivial; I apologize to you both. Potts, you are going to explain why you cannot separate a description from a judgment.

POTTS: Gladly, Sir Edward, and very easily. Harping says that I look down a microscope and describe what I see. I say that I describe what I judge that I see.

SIR EDWARD: Is that an important difference?

HARPING: Of course it is not, Sir Edward. Potts is simply using a trick of speech. What he describes is what he sees or what he believes that he sees; it has nothing to do with judgment.

POTTS: It has everything to do with judgment. Harping tells me that the sunset is red and then asks me contemptuously for the wave length. But I am not a machine—I *use* a machine. That is, I look at the record and then I judge what I shall say. Shall I give Amos Harping the wave length to a fraction of an angstrom? And if so, what fraction? Or will it do to give it to him (and to myself) to the nearest thousand? And that in itself was a judgment, Harping—it was my judgment of your seriousness.

HARPING: Potts, you astonish me. Am I to take you seriously? I talk about profound and human judgments of nature and of art. And you tell me, with a straight face, that reading a slide rule is an act of judgment, too, because you have to make up your mind, your immense and cosmically learned mind, what is the nearest whole number that you will quote from the slide rule. How trivial—no, I beg your pardon, Sir Edward; you used that word. How silly, how fundamentally silly can you be, Potts?

POTTS: Not how silly, Harping: the question is, how fundamental can I make you be. You think that it is trivial to decide whether I shall read a slide rule to one decimal place or to two. What does it matter, you say; one makes whatever approximation is convenient. You are mistaken—deeply mistaken. Every approximation in science is a judgment; it asserts that the analysis need be pushed no further. We can stop here, it says; what has been left out is not important. And what does "important" mean? It means that what has been put in is judged to be relevant, and what has been left out is judged not to be relevant. Every scientific description is of this kind: it puts down what it judges to matter, and it leaves out what it judges not to matter. And then one day a scientist of more adventurous mind makes a new judgment. He decides to push the analysis a step further. He is not content to accept that only so much matters; and when the new detail is included, the picture of the universe that accommodates it is wholly different.

SIR EDWARD: Wholly different, Professor Potts? Is it really very different? Does the picture of the universe really change much because a scientist looks at the next decimal point?

POTTS: Yes, Sir Edward, the picture is transformed. Relativity, as an equation, is only minutely different from Newton's physics; but as a picture of the universe, it is fantastically different. What did Einstein do? Very little. He refused to accept the judgment of others, that time is an irrelevant constant.

HARPING: I don't believe that. I don't believe that Einstein discovered relativity by arguing about another place of decimals. And if he did: if the approximation of a scientist is a judgment, then I have still to be convinced that it is a searching judgment—a judgment which truly involves the man's personality. My butcher makes approximations too, every time he slaps a piece of meat on the scale. Is he a judge, too, because his pocket is involved?

POTTS: A man's adherence to science, his acceptance of that picture of the universe, that is the involvement. Science is an integrated vision, and even when I quote a wave length, I judge every part of science. I judge that the parts form a unity. There are no facts without that unity, no approximations, and no descriptions. That is why I called your distinction a shallow one, Harping. I assure you, my microscope shows nothing that a machine could turn into a description of life. Science is not made by machines, but by men. And the men in my laboratory are as deeply involved, are as wholly parts of their own judgments, as any student of yours who discusses Shakespeare's Sonnets with you.

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SIR EDWARD: I understand you, Potts. You say that a scientist, or a writer, cannot describe what he sees without editing it, rounding it off, interpreting it; and that every such interpretation is a judgment. The young men in your laboratory, you say, are involved in these judgments, deeply, as human beings. But do you think, Potts, that what the men in your laboratory discover is of the same depth, the same intellectual depth and human complexity, as the Sonnets?

POTTS: The men in my laboratory are not all Shakespeares, Sir Edward. And neither are Harping's students. You must compare like with like. The journeymen of science, the journalists of literature, exist in every field. What my young men discover is no doubt about as good as the poetry that Harping's students write.

SIR EDWARD: I am sorry, Potts; I put my question badly. I will try again. Is the vision (I think you called it a vision) that your young men have of nature—is that of the same intellectual depth and human complexity as that which the Sonnets present?

POTTS: Of course it is. The vision that science presents of the physical world now, in the second half of the twentieth century, is, in its intellectual depth, its complexity and articulation, the most beautiful and wonderful collective work of the mind of man.

HARPING: A round and noble sentiment. Am I supposed to be awed by the thought of Professor Lionel Potts reverently contemplating, once a day or so, the intellectual depth, complexity and articulation of molecular biology?

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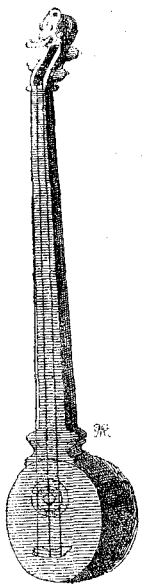
SIR EDWARD: Don't be childish, Harping. Do you think it is more awe inspiring or less ridiculous to think of Dr. Amos Harping contemplating, once an hour or so, the emotional depth, complexity and articulation of D. H. Lawrence? We are not schoolboys, Harping;



we are not even undergraduates, Potts and I. You can't make us blush for our souls by asking us at what time of day we air them.

HARPING: But I do ask you, Sir Edward; I ask you both. Here is Potts parading his fine phrases about the intellectual depth, the complexity, the articulation of science. Not even his own fine phrases: C. P. Snow's, I think, or else Bronowski's. And you are impressed, and I am expected to be impressed, because he or the phrase makers that he quotes have shown—have shown what, Sir Edward? They have shown that science is an intricate and neatly jointed construction. Is this supposed to astonish and silence me? Is this supposed to compare with the wealth of Shakespeare and the warmth of Lawrence? Science is an intricate and neatly jointed construction. Contemplate that once a day, or every other minute. What share do you have in it? Yes, you, Potts, or your students, or your fellow scientists? It is an edifice built almost entirely by others, piecemeal, brick by brick, to which you have added nothing but perhaps another brick of the same kind. This is not a vision of nature; it is a description which is presented to you ready made, and you accept it and look for another brick. Do you seriously compare this, Potts, with the sense of community that my students get when they discuss either Shakespeare or Lawrence? My students (don't sneer at them, Sir Edward), my students have to make their own discoveries, have to find and share and argue their own meanings. What is on the page is only the beginning of their understanding. They do not simply accept the work of art; they re-create it.

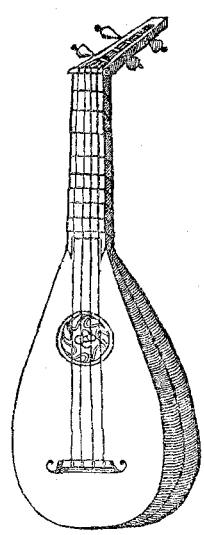
POTTS: Amos Harping, you really are the most fervent, the most devoted and the blindest man that I know. Your students are the salt of the earth; do you think mine are less? Your students stand on tiptoe and reach for the light. Do you think mine do less? Your students argue and discover and re-create every tittle on the page that you read with them. Do you think, can you think, that my students do less? My students wrestle with me the way your students wrestle with you—neither more nor less. My students don't read Charles Darwin any less critically than yours read Christopher Marlowe, and they add as much to Darwin's meaning, they enter as avidly into his mind, as yours do. Good God, Harping, you should come to one of my seminars. Why, my students (my good students) won't even believe Mendel's laws without searching their conscience late into the night.

SIR EDWARD: You must explain that to me, Professor Potts. You're called a molecular biologist. I don't quite know what that is, Potts, but I imagine that it makes you a biologist of some kind. Well, to me, and I suspect to Harping, too, biology is still something of a no man's land. We aren't sure that Darwin and Mendel were altogether scientists, as we think of science. So will you give us an example from physics? Something simple and practical that we learned at school, you know, like Ohm's law—the current in a wire and all that. Are you saying that your students are allowed to argue about the current in a wire?

POTTS: Of course, Sir Edward. Why should an electric current be sacred? My students argue about Ohm's law like mad—that is, if they're any good they do. A dull student can take Ohm's law on trust and learn it by heart: the current in a wire is proportional to the potential difference, and inversely proportional to the electrical resistance. I have no doubt that Harping's duller students learn bits of Joseph Conrad by heart, too, and make good practical use of them when they become schoolmasters or reviewers. But a bright student does not take even Ohm's law on trust.

HARPING: You mean that he goes into the laboratory and tests it for himself with a piece of wire and a battery. That is the extent of his personal participation.

POTTS: No, Harping, it is not. A bright student wants to know why a current acts in this way. He wants to know why, all over the universe, currents flow like this and only like this. What is the nature of a current, he asks, that it has this faithful identity—in my copper wire, in the headlights of your car, in the collision of nebulae, in Sir Edward's gold pin and in a ring of lead near the absolute zero of cold? The good students put it to me that Ohm's law has to agree, to link and make sense, with what they have learned about electrons, about the



structure of metals and about the picture of the atom that Rutherford created.

HARPING: But what does the student get from this, Potts? What do you and your fellow scientists get from it? You confirm that the description of nature that has been made by others is internally consistent. Is that a profound experience? Science is an intricate and

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neatly jointed construction; I know that, I said it. And I ask again: Is the realization of this what a scientist calls a profound experience?

POTTS: There are two questions there, Harping: one about nature and the other about scientists. I will answer the one about nature because to me it is fundamental. When the student sees that Ohm's law flows from the behavior of electrons, when he finds that it is part of, and that it expresses, the structure of matter itself, then he does have a profound experience. He knows that nature is one in all her expressions. And he knows that he is one with nature—he is one of its expressions. It is not the intricacy of nature that moves him then, Harping — what you call the neat jointing, the clockwork mechanics. It is the sweeping simplicity of its means that overwhelms him with a sense of awe. This is what makes nature beautiful to him, Harping: the simplicity of the materials which make so many patterns, the unity under the surface chaos. It was Coleridge's definition of beauty, "unity in variety." This is the scientist's definition of beauty, and it makes nature beautiful to him all his life.

SIR EDWARD: But Potts, the sense of being at one with nature is not the prerogative of scientists. We all have it at times, and when we have it we find nature beautiful and inspiring.

POTTS: We all have it at times, Sir Edward, as a strangled, unformed and unfounded experience. But science is a base for it which constantly renews the experience and gives it a coherent meaning. I find the sunset beautiful even though I am color-blind—which is the shortcoming that I was trying to hide from you earlier this evening. But Harping, you see, does not find the sunset beautiful, and he does not want to talk about it because he has no base for his incoherent sense of awe. Harping can only talk about human works of art.

HARPING: For the first time Potts has said something that impresses me. He has said that science gives him and his colleagues a sense of the unity of nature which is better founded than the shy moments of euphoria which you and I are swept by, Sir Edward. That makes sense to me; I give him that.

SIR EDWARD: I am glad to hear you say it, Harping.

HARPING: It makes sense to me because it underlines that Potts and I are doing different things. He is analyzing the workings of nature, and that would be a pitiful chore if nature did not move him and fill him with wonder. I, on the other hand, am fascinated by the expressions of the human spirit. That is a different fascination. Potts is quite right; nature alone, nature without the human spirit, means nothing to me, and I avoid discussing it if I can. I tried to avoid talking about the sunset this evening. It was acute of you to spot that, Potts, and I plead guilty.

POTTS: That's very handsome of you, Harping. I am proud to have convinced you.

HARPING: Not so fast, Potts, not so fast. You have convinced me that your students do not merely copy what you tell them, that they unravel the links in nature for themselves and that this experience makes them feel that nature is simple, profound and beautiful. Am I putting that fairly, Potts?

POTTS: Very fairly.

HARPING: But if that is so, Potts, where is there room for the individual judgment? You have a description of nature, your students argue about it, they have to see for themselves how intimately it hangs together, but at the end of the argument they accept the description. The argument adds nothing—nothing for you and nothing for the student except to teach him the connections in nature. What was the point of the argument? There is nothing to argue about. This is how nature goes, take it or leave it. Nature is not open to argument and it cannot be enriched by the play of individual judgments and the human analysis of motives. Nature works and that is beautiful. Period. Can you understand now, Sir Edward, why I have no truck with such a definition of beauty?

SIR EDWARD: You must leave me out of this, Harping. I shall bore you, and anger you too, if I tell you that I prefer the sunset even to Shakespeare's Sonnets.

POTTS: But I don't, Sir Edward; I don't prefer the sunset; and I will not let Harping foist it onto me. You see, Harping talks as if there is only one vision of nature—

HARPING: I don't talk about a vision at all. I say that there is one nature, and you either describe her or you fail. There is no other choice for you.

POTTS: I will try to find a neutral word. Harping does not accept the word "vision," and I do not accept the word "description" of nature. Let me try "picture of nature." Will you allow that, Harping?

HARPING: Let me hear what you have to say.

POTTS: I say that you talk as if there were only one picture of nature, a standard photograph which I and my students and my colleagues all have, now and forever, amen. But science isn't a bible — not even a bible of facts; and not even the facts stand still or look the same to two different students. Isaac Newton put a vision of nature before me—I beg your pardon, a picture of nature. It was not the same as mine is. Tell me, Harping, was that a fault in Newton?

HARPING: Yes it was. There is only one nature; you imply that when you are awe-struck by her unity. And if there is only one nature, then there is only one correct description of it. Anything short of that description is an error, and even if the error is Newton's, it has no interest except as history.

POTTS: No, Harping. There is no correct description of nature. Nature is more subtle, more deeply intertwined and more strangely integrated than any of our pictures of it—than any of our errors, Harping. It is not merely that our pictures are not full enough; each of our pictures in the end turns out to be so basically mistaken that the marvel is that it worked at all. If relativity is right, then the marvel is that Newton's machanics worked at all.

HARPING: And what becomes of the unity of nature, Potts? Where are the connections? Where is the profound and underlying organization among these errors?

POTTS: But nature is the unity, Harping. We do not have to invent that. It exists out there, visibly, as its own proof. And it strikes us with awe exactly because it is so rich;

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because it can contain and embrace and be mirrored in all the pictures—Newton's as well as Einstein's, and Rutherford's atom as well as the wave equation of Dirac. Do you suppose that my students think that Rutherford was a fool because the atom has turned out to be more subtle than he pictured it fifty years ago?

HARPING: I don't understand you, Potts. You have a right to be sentimental about Rutherford yourself, of course; you probably remember him. But why bother your students with him? They want to know the facts; they want to know what the atom is like, truly. Why should they be interested in the past errors of legendary heroes? Rutherford is just a piece of history to them, a quaint allusion — another of your literary tags, like Samuel Butler, that is intended to make science look gentlemanly and cultured.

POTTS: Rutherford is part of the evolution of physics, of that wonderful collective work, as the Elizabethans are part of the collective evolution of literature. And Rutherford was the greatest of his contemporaries, as Shakespeare was the greatest of the Elizabethans. To be ignorant of what Rutherford believed is as uncouth as not to have read Shakespeare. It would be uncouth in my students, and it's uncouth in you, Harping—and in you, too, Sir Edward, if you claim any share in the culture of England in the twentieth century. Good God, how can you ask me to speak up for England at conferences, and quote Shakespeare, when you think that Rutherford is only a quaint figure in the history of science, like Dr. What's-his-name in *Tristram Shandy*?

SIR EDWARD: That is rather severe, Potts. However, it's what I'm here to mark and consider; so you must say what is in your mind. Is Potts's stricture fair, Harping?

HARPING: No, it is not fair, Sir Edward. It is a play with words, and no more—a skillful cliché, a cliché from the weeklies and the smart Sunday papers, but still a cliché. There is no ground of comparison between Rutherford and Shakespeare, and they do not belong to our culture in any similar sense. How can you draw an analogy between them, Potts, without blushing for your manipulation of clichés?

Shakespeare did not use language in that way; he used it to express the essence of human motives, to evoke them and to command them so that his language in itself created a judgment of the condition of man. Do you dare to ascribe such creations of the human spirit to any scientist, however powerful his mind? He may be a master in experiment, an eagle in observation and subtle as a spider in spinning his theories; but he remains earth-bound—bound to the sunset if you like, bound by the inhumanity of nature. Potts, how can you call any scientific mind, even Rutherford, a Shakespeare? That is nothing but cheap journalism.

SIR EDWARD: Don't answer him yet, Potts. I want to hear what you're going to say. So give me a moment, please, to taste the claret first. Yes, excellent, it will do very well with the veal. I apologize for the laminae of veal, gentlemen; but you know how the Swiss are about meat. A small country making money naturally likes conspicuous display, such as these acres of veal on our plates. But the Swiss are too greedy to let the display go to waste; they eat the meat, every crumb of it. If Thorstein Veblen had been Swiss and not Scandinavian, he would not have invented those grand theories about conspicuous waste.

POTTS: I should like to sustain my comparison, Sir Edward.

SIR EDWARD: You must, Potts, you must. But let me remind myself first how we got to it. Harping had granted you that scientists have cause to feel, in their work, a sense of unity with nature. But then, he asked, if nature is the criterion, how can the scientist claim a personal vision? How can you compare the free imagination of Shakespeare with the earth-bound inquiries of Rutherford? Go on, Potts, I've found my place.

POTTS: I should like to explain (and I had better do it in detail) why I think that a great scientist's picture of nature is as truly a creation and, yes, a vision, as is Shakespeare's vision of the human state. But I will grant Harping one thing: that Shakespeare is not a good subject for the comparison he has challenged me to make. Shakespeare is not a good subject, not because he is Shakespeare, but because he is a writer. I would like to make the comparison with some other kind of artist; a sculptor, perhaps, or a composer, or a painter—someone who does not use words; someone who can be appreciated in every language. Will you give me a painter, Sir Edward?

SIR EDWARD: Leonardo da Vinci.

HARPING: I won't agree to Leonardo; he was too close to science to make a fair comparison. If we are to have a painter, he must be a pure painter.

POTTS: Choose a pure painter, Harping.

HARPING: I will choose Rembrandt.

POTTS: Very well, I will compare Rutherford with Rembrandt. They make a very good pair. They were both dedicated men, both absorbed in their own activity to the point of passion. You recognize them at once, these creative men, by their patience, their preoccupation, their physical immersion inside the things they make. Their work is a world for them.

SIR EDWARD: You must not beg the

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question, Potts. You have slipped in the word "creative." I have no doubt that Rutherford was always busy with his work, and single-minded like Rembrandt. I accept your bon mot: their work was a world for them. Men like that are fortunate; they are happy in their work, even in adversity—absorbed, happy and fulfilled. I accept all those words, Potts. But creative? Have you given me any ground for the word "creative."

POTTS: Rembrandt and Rutherford both made something, Sir Edward. And what they made was original. Isn't that the definition of creation?

SIR EDWARD: Now I'm not happy with your word "original." It's too narrow for what we are trying to grasp. No doubt Rutherford had an original mind; but the mind is only a small part of a rounded personality. What I want you to tell me is quite downright: Is a great scientist creative, not merely as an intellect, but as a man? And if you shift your ground to the word "original," you do not satisfy me; you merely make me use your new word to ask the old question. Is the physics of Rutherford original in the same deep sense that the paintings of Rembrandt are original? Does the physics of Rutherford express the whole man, head and heart, in the same deep sense that the paintings of Rembrandt evidently look at us out of his whole self?

POTTS: I think it does, Sir Edward. Rutherford's physics is as subtly woven together, as delicately compounded of both sides of him, fact and imagination, as every human activity is. Neither his science nor any science is all head, all fact; and Rembrandt's painting is not all heart either, a rainbow cloud of fancies without a base of fact.

HARPING: Clichés, my dear Potts, clichés. Sunday journalism.

POTTS: Let me finish, Harping. I was talking about fact and imagination, in physics and in painting. You will agree that Rembrandt as a painter was wedded to the facts. In one sense, his paintings are an exact description of what he saw. Rembrandt's paintings are not photographs, certainly; but they are representations, and they were intended by Rembrandt (and accepted by those who commissioned them) to represent reality. In this sense, Rembrandt's paintings are every inch as factual as Rutherford's descriptions of his experiments.

SIR EDWARD: Go on.

POTTS: But, of course, Rutherford's reputation was not made by his description of the experiments. It was made, like Rembrandt's, by his interpretation: his interpretation of what lay hidden below the surface reality and of what the experiment or the painting unfolded and revealed. One experiment, one painting, pointed the way to the next, until they wove together a network of interpretations which made a single image.

SIR EDWARD: An image of what?

POTTS: In Rembrandt's self-portraits, an image of himself. In Rutherford's atomic experiments, the extraordinary and unbelievable image of the atom as a minute solar system.

SIR EDWARD: And these images are not true?

POTTS: What is truth? Is the sequence of Rembrandt's self-portraits the truth about himself? The atom is not truly a small solar system. Rembrandt and Rutherford both began with the world of fact. Both of them put down in the first place what they saw; and both of them transferred what they saw into something more delicate and more illuminating than any mere record of the facts. The painter's portrait and the physicist's explanation are both rooted in reality, but they have been transformed by the painter or the physicist into something more subtly imagined than the photographic appearance of things. The portrait and the theory are, both of them, at once more original and more personal than the commonplace eye of the camera.

SIR EDWARD: You are now equating "original" and "personal."

POTTS: Of course—because to see something in an original way, we must see it in a personal way. This is obvious about paintings. Every intelligent layman, when he looks at a painting, knows that it combines two elements. He knows that it is a picture of reality, and he also knows that it is reality as one man sees it. The painting is two things: a picture and a vision. But the layman has still to learn, you both have still to learn, that what is true of painting is also true of physics—that physics also, I have to repeat it, is constructed by men, not machines. Of course, physics is an account of physical reality. But the turning points in this account, the moments of great discovery in physics, are flashes of vision when a single man sees a new link between different and apparently unrelated aspects of reality. In this visionary moment, the great scientist lays bare a new linking, a new pattern among things. And his vision is as imaginative, as much a creation, as the painter's vision.

SIR EDWARD: Then why does the scientist have no difficulty in sharing his vision with others? If Rutherford saw with so personal an eye, why were his findings accepted by other scientists as soon as they were published? I seem to remember that Rutherford went to the Lords; but Rembrandt died in poverty.

POTTS: There have been painters who went to the House of Lords, too, I think; and great scientists who died misunderstood and neglected—Mendel, for one. But you are right: the scientist can make his vision acceptable in a more systematic way than the painter can. That is, there exists a method of handing on the findings of physics to other people so that they usually accept them; and there exists no such assured method in painting. But the method is only an exposition; it has nothing to do with the way the finding entered the mind of the discoverer. The finding, in physics as much as in painting,

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remains a personal illumination; we help every student to re-create it, but we cannot teach one student to create it. Rutherford's model of the atom was not a fact simply concealed in nature and waiting for any Tom, Dick or Harry to fish it up. Rutherford's absurd and wonderful model of the atom was an imaginative discovery, a highly personal way of seeing nature—even though Rutherford was then able to persuade a million other physicists to see nature in his way.

SIR EDWARD: You are very persuasive, Potts; and of course, you are convinced yourself. Yet you still perplex me. I still don't know how Rutherford's way of looking at things was different from that of other physicists who were, I suppose, doing similar experiments at the same time. Obviously, Rutherford was different; but was he different as a person? Was he not simply cleverer?

POTTS: In his critical experiment, Rutherford and his students fired helium particles at a thin layer of atoms. He was astonished to find that some of the helium particles did not go through, but came back at an angle. Rutherford expressed his surprise by saying that he felt as if he had fired an artillery shell at a sheet of tissue paper, and it had bounced off. He concluded that the tissue paper must be full of holes and lumps—and that each atom must be full of holes and lumps. That is how Rutherford came to the idea, from this metaphor, that the atom is not an electric cloud. Each atom has an inner structure: there is an inner lump or nucleus, and then a ring of light electrons. The electrons circle the nucleus at quite large distances, just as the planets circle the sun a long way off. And whether things go straight through the atom or whether they bounce back at strange angles depends simply on whether they brush through the open space or whether they actually hit the heavy nucleus.

SIR EDWARD: I understand the picture, and I see how it derives from the metaphor. Indeed, it seems to me that there were two metaphors in Rutherford's mind: first the artillery shell, and then the solar system. You will say, Potts, that the metaphors were individual to him, and that linking them together was most individual.

POTTS: To anyone who knew the bluff colonial manner of Rutherford, the roughness and the twinkle, the solemn sense of pulling his own leg, everything in his discovery of the structure of the atom is of a piece. The metaphors are as much a part of Rutherford's personality as the idea of the experiment. They all have the thumb print of a man to whom the core of things had a strong and clear outline — even if it was as minute as the nucleus —and who judged things by tests which had to be equally clear and strong. Everything here is as individual and as human as Rembrandt. Do you remember the pictures of his mistress that Rembrandt painted as an old man and that no one would buy? They have the same obstinate tangle of feelings, rough and tender at the same time, that Rutherford had for his mistress, nature.

SIR EDWARD: In short, Professor Potts?—

POTTS: In short, a rich, broad body of science is like a rich, broad body of painting—and of poetry, too, though I have preferred not to discuss that. It springs from the vision of a rich, broad person, head and heart together, and the surface facts deepened and transfigured by the creative metaphors of the imagination. In short, Sir Edward, if I have to give you a single answer to the question, "What makes a great scientist?," then I say that he is made as every creative man is made, painter or novelist, musician or poet. A man can only create something of which he has a vision. Rutherford was as much a visionary as was Rembrandt, or Beethoven or Shakespeare. And that has already been said by a poet. William Blake said, as if he were speaking about science: "What is now proved was once only imagin'd."

HARPING: Of course; the tag from Blake. No lyrical account of science is now complete without a quotation from William Blake. And when Rutherford's vision of the atom turns out to be a hallucination, when the picture is proved wrong, does Blake have a wise saw for that, too?

POTTS: Yes, he does, Harping. Blake knew that human knowledge goes forward by an endless march of false steps. He said:

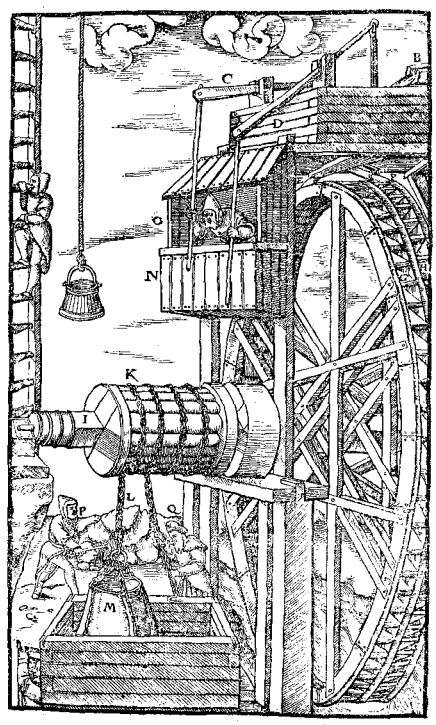
To be an Error and to be Cast out
is a part of God's design.

SIR EDWARD: I must stop you, Potts. I ordered a dish that will not wait, and I see it approaching. A cheese soufflé: this is something that the Swiss do very well. I will give you the first helping, Potts, and you are to make no sound for a while but the sound of eating. You have done very well. You have made me see into a great discovery; you have made me catch the undertones in it, and now I know what you mean when you call it a work of creation. He has been very enlightening, Harping, don't you agree?

HARPING: Yes, Sir Edward, I agree. He has put his case well, and he has made me weigh things that I held too lightly before. I shall not forget what you have said, Potts; I shall think about it.

SIR EDWARD: But, my dear Harping, but—do I hear a "but" in your voice? What is your "but"? You have almost got as far as saying "yes" to Potts; there must be a "but" to hold it down.

HARPING: Of course there is, Sir Edward; a large "but," a "but" as large as life. My "but" is, haven't



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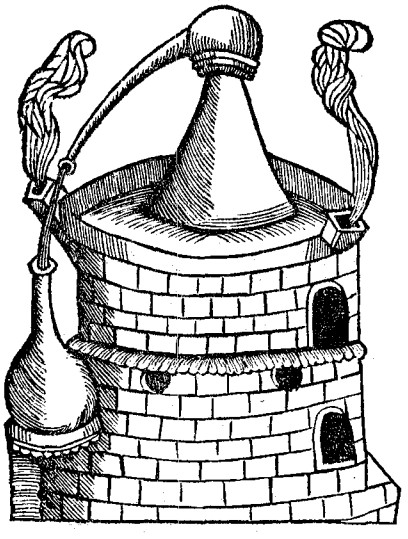
we lost sight of life? It is very fine to praise the visions of Rutherford and Einstein, and to trace the personality in their discoveries. But how does the discovery enter, not their lives, but ours? How does the vision express itself in the realities of the human condition now?

SIR EDWARD: Yes, Dr. Harping? How?

HARPING: In the hydrogen bomb, Sir Edward. That is how Einstein's insight and Rutherford's metaphor enter the life of modern man: not as a Rembrandt, but as a bomb. The atom may have symbolized the unity of nature to them; to us, the very word is a threat to tear nature apart. Science may have been a dream of life to them; to us, who breathe the reality, it is the threat of death.

SIR EDWARD: Oh come, Harping, that's rather hard. We have enough



of the hydrogen bomb at the conference. Must you drag it in here? Surely our talk this evening is outside politics; I'd rather not turn it into a Trafalgar Square sit-down. I don't think the hydrogen bomb is in place here.

HARPING: But it is in place, Sir Edward; it's squarely in place here. You call the big bombs a piece of politics, and that reassures you. You can then shut your mind to them and write off as cranks those who won't shut their minds. You've missed the point, Sir Edward; the point of the pickets and the sit-down squatters and the bearded cranks. The hydrogen bomb is not a piece of politics to them. It is the monstrous climax of an invasion that has mounted and mounted since the day they were born.

SIR EDWARD: I don't follow you, Harping.

HARPING: People are protesting against the invasion of their lives, not by this death-dealing machine or that, but by the machine itself —by the machine as a form of spiritual death. Do you really think in Whitehall, Sir Edward, that all those sandaled men and homespun women are marching from Aldermaston because they are afraid to die in a sizzling sunset flash? No; they are protesting against the mechanics of all that is happening to life; against the domination of life by mechanics. They are not afraid that mankind will perish; they are afraid that *humanity* has perished already under the big wheel of scientific progress. Potts, I will give you a quotation from Blake, too: take it to heart, and you, Sir Edward.

A Machine is not a Man nor a Work
of art;
it is destructive of Humanity and
of Art;
the word Machination.

SIR EDWARD: Very well, Harping, I will withdraw my remark about politics. I accept that you at least (I will not include the marchers)— I accept that you are objecting to the mechanization of peace as well as of war. Yet, I still ask, is that relevant to our discussion this evening? The sun is down and the stars are up; the atomic processes of nature flash and glitter in the sky, a fusion and profusion, in honor of Einstein and Rutherford. Is it right to blame them for the technical uses and abuses to which their discoveries have been put by others? After all, we didn't ask Potts to defend technical civilization. We asked him to give us an exposition of science as an imaginative culture.

HARPING: Whom else shall we blame? I am sure Einstein was a good man, Sir Edward, just as I'm sure Christ was a good man. But if you lived under the Inquisition, you would not be content with the thought that Christ did not plan it. I live under the shadow of destruction: physical destruction and spiritual destruction by the material domination of science. I am not content with the thought that Einstein did not plan that. You spoke just now of science as a culture; Potts is fond of speaking that way. A culture is made up, intimately made up, of two related parts: an activity and a vision—a way of doing things and a way of thinking and feeling about them. I do not like to stand by and see our scientific civilization do things inhumanly simply because Potts tells me that great scientists have a vision.

POTTS: And what would you like to do, Harping?

HARPING: I would like to destroy the idol of technical advance. I would like to get rid of the preoccupation with productivity, with material standards, with hygiene and technology and progress. I would like human beings to stop worshiping the machine. Do you know what all this talk about a scientific culture does to the arts? It makes an architect famous because he says that a house should be a machine for living. I do not want to give my mind to living; I want to give it to life. And I do not want a machine house; I want a home.

POTTS: Even if home is a slum, Harping? Even if hygiene and progress are to get the bedbugs out of the woodwork? You talk as if material standards were something vulgar that the poor ought to be ashamed to enjoy, like sex and cheese soufflé. Do you really want me to be ashamed of the help that science has given in feeding people and housing them and giving them transport and print and sanitation? Do you think people would be better if they were less healthy?

HARPING: They would be better if they thought less about their health. And they would certainly be better if they thought less about their wealth.

POTTS: You forget what thinking has done for people; thinking about their health, and their station and their ambitions and gifts. This is the drive behind the material advance, this is why people struggle for the comforts that you affect to despise: because they want to lead fuller lives, to become individuals; not just because they want to have more, but because they want to be more. What was your father, Harping?

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HARPING: Why should you want to know? He was a tailor. What was yours?

POTTS: Mine was a groom. He really was an Irish groom. Do you think that the sons of the tailor and the groom would have gone to Cambridge a hundred years ago? Or that, even now in Mexico, you would be a critic and I a biologist? Don't belittle our industrial civilization, Harping. It has many aberrations, all the way from bombs to stomach ulcers. But it does one thing better than any other civilization has done it: it gives young men the chance to make the most of their talents.

HARPING: You are always thinking about people's talents. I am thinking about their lives—their personal relations, their loves and rejections, their community with themselves and with others. These are the values that industrial society destroys, and in their place it puts nothing: a blank, a mass entertainment which demands neither their attention nor their participation, a television screen which grimaces so inanely that it would be better blank. Whitewash your brain blanker than blank. My father was not prosperous enough to go to public entertainments, and would not have had the leisure if he had been. He didn't see cowboy films or play bingo, he didn't have a betting shop around the corner and he didn't fill in the pools. And if these constitute the total benefit of prosperity and leisure, then I will say, as Dr. Leavis says: the felicity it represents cannot be regarded by a fully human mind as a matter for happy contemplation.

POTTS: My dear Harping, rubbish! How can you be so ignorant of the lives of your contemporaries? As if working men did nothing but drink and bet and wait for you to tell them what to do with their leisure. And how solicitous you are for their leisure! Is yours so well spent? Is yours, Sir Edward? No one ever seems to have any trouble with his own leisure. It is only other people's leisure that is a social problem. The fact is, Amos Harping, you are a Puritan. You cannot bear to have other people enjoy themselves in any way but yours. That is what you find distasteful, that is what outrages you about the success of technology. It makes it too easy for people to be well off, well fed, just well. Your soul is still in the age of famine; you have not come to terms with the prospect of plenty. You believe that the values of life come from denial, not acceptance. And when you see other people idle, how mealy-mouthed you become—like a bishop, or like Sir Edward St. Ablish writing to *The Times* about the welfare state! Did you really hear your quotation? "The felicity it represents cannot be regarded by a fully human mind as a matter for happy contemplation." What is a fully human mind, Harping?

HARPING: It is a mind that does not lull itself with your ready-made optimism, like a liberal weekly. It does not take the culture of the Sunday papers, even the high-brow Sunday papers, to represent the best that is thought and known in our time.

POTTS: Do stop these evasions, Harping. And stop nagging at the Sunday papers. They do a simple job: they take the place of the Sunday sermon and the Bible reading, and they do it well. And their style is better than yours. I asked you a question in your own words: What is a fully human mind? Give me a positive answer, not a negative one.

HARPING: It is a mind which is occupied with the human state, as an individual in a living community. It sees its life and its work in relation to those of its neighbors, as an exchange among equals. It is not concerned to keep up with the Joneses in jobs or cars or washing machines. That may seem a primitive life to you, Potts. Yet, if I have learned anything from my students, anything from my academic fellows and, yes, from my master, it is that this primitive life is a good life. Potts, Sir Edward—I will ask you both the question that Dr. Leavis asks: Who will assert that the average member of a modern society is more fully human, or more alive, than a Bushman, an Indian peasant, or a member of one of those poignantly surviving primitive peoples with their marvelous art and skills and vital intelligence?

POTTS: Who will assert *what*? I assert it, Amos Harping. I assert that the average man who drove our train up here is more human and more alive than any of your poignant primitive people. The skills of the Bushman, the vital intelligence of the Indian peasant? You are tipsy with sentiment, Harping, or you would not compare them with the man who reads your proofs. The Bushman and the Indian peasant have failed in culture: in making a picture of the universe rich enough, subtle enough; one that they can work with and live by beyond the level of the Stone Age. They have failed because they did not create a mature view of nature, and of man, too, Harping. My God, you talk, you dare to talk, of their marvelous art. Since when have you been an admirer of Bushman art, Harping?

HARPING: That's a pointless question, Potts. I have always admired it.

POTTS: Then why did you give me Rembrandt when I asked you for a painter? Why do you, Dr. Amos Harping, lecture to your students

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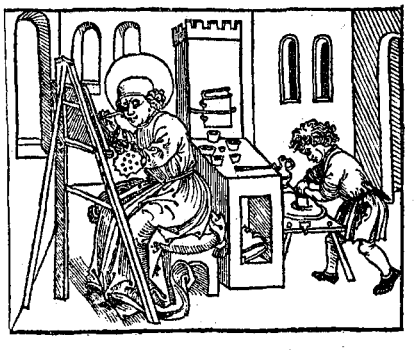
about George Eliot and not about Indian folk poetry? Because you know that Rembrandt is a more mature artist than any Bushman, and George Eliot than any folk singer. I don't understand you, Harping. How can you be so blind to the evidence of your own practice? You try to enrich the emotional appreciation of your students—how? By discussing Shakespeare with them; and Joseph Conrad and D. H. Lawrence. How does it happen that Shakespeare was not born in the bush?—or Conrad or Lawrence? Every work that you present to your students as masterly, as profound and sensitive, was produced in a society with a high standard of technical sophistication.

SIR EDWARD: Say that again, Potts. That is a new thought to me, and an interesting one.

POTTS: Yet, surely it should be a very immediate thought, Sir Edward. Here is Amos Harping preaching to us that the greatest works of man express his concern with his own life and condition, with his own humanity. And that concern and that humanity, he tells us, are eroded by the advancing tide of technical civilization. Indeed, in a heady moment he says that modern man is less fully human, on the average, than the poignantly surviving primitive peoples. Very moving! Hitler used to say it, too, and call it "Blood and Soil." But do the great works of men come from the poignant primitive peoples? Do they even come from the poor whites of Tennessee, from the stony fields of Spain, or from the starveling fisheries of Sardinia? Of course not. Dr. Harping lectures on none of these. Then where were the searching analyses of the human condition made? Where were the books written that most deeply express and explore the humanity of man? In the Athens of Sophocles, in the Florence of Dante, in the England of Shakespeare. Yet these were not simple, ascetic societies; on the contrary, they were the most highly developed technical and industrial societies in history. That is where the human mind realized itself most fully: in the cities that stand at the peak of technical achievement in their time. That is where great men flower, Harping, whatever you may say about the average man. The evidence is there, in the books you recommend to your students for their human insight.

HARPING: The evidence is a trick, Potts; you read it falsely. It is a mere trick to say that Athens and Renaissance Italy and Elizabethan England were technically advanced. They were not dedicated to the worship of gadgets. They were not slaves to the technological search for hygiene and personal comfort.

POTTS: Archimedes was having a bath when the idea of specific gravity came to him. That was in Syracuse, a colony of Greece. If Archimedes had been born in the culture of Tibet instead of Greece, he would no doubt have been just as shining and incisive a mind. But he would never have jumped out of his bath and shouted "Eureka," because he would not have had a bath.



SIR EDWARD: Is that very subtle, Potts? Surely Archimedes in Tibet would have failed to make his discovery for deeper reasons. He would have been thwarted by the lack of understanding, by the emotional hostility of his surrounding civilization.

POTTS: Of course, Sir Edward: he would have been thwarted by Dr. Harping. And Harping is against baths. You have just heard him; they represent slavery to the technological search for hygiene and personal comfort. The emotional hostility to science is all of a piece. Harping's puritanism is the same here and in Tibet; and it hates the material bath and the vision of the atom, both together.

HARPING: I refuse to discuss baths in Tibet, about which none of us knows anything. And I refuse to be drawn away from my point. Potts's reasoning is simply false. Yes, greater works were produced in Greece and her colonies and in Renaissance Italy and in Elizabethan England than elsewhere. But these places, these islands in history, were not technical societies in our sense. They were civilized cultures; they were not industrial treadmills as our society is. By your evidence, Potts, our society ought to be producing its Sophocles and Dante and Shakespeare; where are they? Or are you going to claim D. H. Lawrence, because he was born in industrial Nottingham and hated it? All that our scientific, hygienic, technological society did for Lawrence was to hound him to death.

POTTS: You talk as if Lawrence had been persecuted by a conspiracy of physicists. The people who persecuted Lawrence were the same people who abused Einstein: not physicists but Philistines. Lawrence was driven out by the Establishment, by people like Sir Edward here—let's face it. And people like Sir Edward are just as hostile to new science as they are to new art. As a matter of fact, Philistines like Sir Edward are hostile to any kind of science; and you ought to be ashamed to join with them, Harping.

HARPING: I am not on the side of the Establishment. Good God, I have fought Sir Edward and the Philistines all my life.

POTTS: All the same, Harping, the ranks of the Philistines are full of literary critics, and they are not full of scientists. Perhaps that is the strength of science, and its inspiration to the young: that those who are dedicated to it are themselves creators of science—modest creators, but creators. There are no critics in science, no high priests who only expound and guard the godhead. I am embarrassed by your form of priesthood, Harping. The gods you guard are always dead: even D. H. Lawrence. I wish I had heard you once praise a living writer. Don't you have any living poets or novelists at your university?

HARPING: That is a fashionable heresy: that a literary teacher ought to qualify as a poet, or a commercial novelist. I don't share it.

SIR EDWARD: Then you must not be surprised, Dr. Harping, if for once we Philistines side with Potts. I think that you would have liked to

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be a poet, but you have not enough joy and zest and confidence. You are a self-defeated man, Harping: the kind whom John Dryden meant when he said, "The corruption of a poet is the generation of a critic."

POTTS: Don't abuse Harping, Sir Edward. It was I who rounded on you, not he.

SIR EDWARD: I know that, Professor Potts, but I haven't got to the bottom of you yet. I don't think I shall. But there is still the issue that I want to see settled: something that you said that struck me as quite fresh. You said that the great works of art of the past were always created by people with high technical standards of living. Harping says they were not.

POTTS: Harping is wrong. The great ages of art in the West were in Greece, and Italy in the Renaissance, and the England of Elizabeth and the Restoration. Those were also the places that were technically most advanced, most inventive, most excited by the adventure of progress. And people lived better there, ate better, had better tools than anywhere else in the then-known world.

HARPING: Yet I say that these were not technical societies, machine societies, in the modern sense.

POTTS: You are wrong, Harping; you sentimentalize the past — the Elizabethan past as much as the Bushman past. You think that a Renaissance water wheel was charming and a dynamo is not, just because the water wheel was made of wood. And you really think that the silver mines of Greece were more human, more cozy, than a coal mine today. You are wrong. Those people made a high standard of living for themselves exactly as we do, by working for it, working hard and with the best tools that man had then invented.

HARPING: They didn't play bingo and read comic strips.

POTTS: Didn't they Harping? How do you know? The evidence is that they did whatever gave them pleasure and that everything in life gave them pleasure. Are the mystic numbers of Pythagoras different from bingo? Are the dirty pictures on the Greek vases different from ours? Those people saw life as one, the whole of intellectual life—numbers and pictures, the lover and *The Iliad*, the shapes of atoms and the great plays and the Socratic dialogues. You are the one who divides life into little pieces, Harping—each piece as big as the bite of one critic. But the creative drive, the lust to make and discover, the itch of originality — *that* gets a whole age by the scruff of the neck, and then art and science and technology go forward headlong, higgledy-piggledy, as confused as Leonardo da Vinci and as universal as Aristotle. You know very well, Harping, that Marlowe didn't spend his time with literary critics; he spent it with mariners and scientists and adventurers. Galileo's father was a musician, but he did not sneer at his son for taking up science. In those ages, the great ages, technical well-being and art and science were all one; and so they can be today if we let them. We have creative men in art as well, I have no doubt, if we let them breathe—if we open their minds to our world, not the world of the Bushman. I shall never change you, Sir Edward; you *are* the past.

SIR EDWARD: Oh what nonsense!

POTTS: But Harping has no business to play the obscurantist. When Galileo wrote his "Dialogue on the Great World Systems," the Church broke him: that was you, Sir Edward, your Establishment — they called it the Inquisition in 1633. What side were you on, Dr. Amos Harping?

SIR EDWARD: Gentlemen, gentlemen, I have quite forgotten myself. I ordered wild strawberries as a "bonne bouche," and the last drops of the Pouilly Fumé to spill over them. And coffee, and a glass of brandy. How an evening slips by. We have thirty minutes before the last train. It has been a wonderful evening—I beg your pardon, Harping; a splendid evening. Thank you both. Let us give the last of it to the stars, and the strawberries, and the brandy. All but one minute, Professor Potts. I cannot go back to the conference without asking a one-minute question. Potts, I still don't know what a molecular biologist is, and now I never shall. Don't tell me. But tell me this: why are you scientists so successful? Why are you conquering the world, in spite of me? Why are you conquering the young, in spite of Dr. Harping?

POTTS: Because ours is a vision and an activity together, Sir Edward. That is how Harping defined a complete culture, and it is: science is a complete culture. We are the visionaries of action; we are inspired with change. We think the past preserves itself in the future of itself, the way Isaac Newton is changed and still preserved in Albert Einstein. We are the culture of living change.

SIR EDWARD: And is that enough, Professor Potts? I belong to the Establishment, which means, you say, that all my life I have believed that tradition is enough. Well, suppose I am wrong. But does it follow that change is enough? Any change?

POTTS: No, Sir Edward, not any change. What we are changing is the division of life. We are making a unity—a complete culture, a unity out of variety. I will tell you what a molecular biologist is. He is a man who unravels the secrets of life by using the tools of physics. He shows—we have shown—that the structures of biology become intelligible when we treat them, not as strings of mysteries, but as strings of molecules. Those are the changes in the picture of the world that we drive for. That is the universal unity in which we believe. I wrote a poem once about art and science and the unity of all things. May I recite it, Sir Edward?

SIR EDWARD: You ought to ask Dr. Harping. But I will listen anyway.

POTTS:

I, having built a house, reject
The feud of eye and intellect,
And find in my experience proof
One pleasure runs from root to roof,
One thrust along a streamline
arches
The sudden star, the budding
larches.

The force that makes the winter
grow
Its feathered hexagons of snow,
And drives the bee to match at
home
Their calculated honeycomb,
Is abacus and rose combined.
An icy sweetness fills my mind,

A sense that under thing and wing
Lies, taut yet living, coiled, the
spring.

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Art and Revolution

THE FABULOUS LIFE OF DIEGO RIVERA. By Bertram D. Wolfe. Stein & Day. 457 pp. $10.

Hilton Kramer

Thirty years ago, the name of Diego Rivera counted for a great deal in this country. It signified both an artistic achievement and the comprehensive dialectic of politics and aesthetics that lay behind it. Both the achievement and the dialectic loomed importantly as possibilities to be emulated. Today, they do not. The tide of history has left Rivera's art isolated in his native Mexico, a local rather than an international concern. Painting the world over has continued in the direction Rivera scorned—the direction of the aesthetically refined easel picture produced for a limited audience of cultivated connoisseurs and bourgeois collectors. Even in the advanced Communist countries, it is to modernist art derived from Paris and New York that the new generation of managers, intellectuals and technicians looks with favor, not to the kind of public and programmatic painting at which Rivera himself excelled.

This new biography of Rivera—Mr. Wolfe's second attempt at the subject—does not come to us, then, with the air of urgency and excitement that many readers must have felt on reading the author's first biography of the artist in 1939. (The new book is not a revision, incidentally, but a completely fresh work.) It is not of a living artist still provoking aesthetic, political and personal scandals that one reads here, but of a historical figure who has become remote from current artistic concerns. Yet, *The Fabulous Life of Diego Rivera* is an immensely interesting book, and it raises more questions than this reader expected it would.

Rivera was born in 1886 in Mexico, and his principal work—the enormous frescos that adorn public buildings in Mexico City and elsewhere—was done there; but he came of age, artistically, in Europe. When Mr. Wolfe first met Rivera, in 1922, the painter had only recently returned to his native country after thirteen years abroad. Those years were mainly spent in Paris where Rivera, after an initial stay in Spain, became a participant in the bohemian and advanced artistic affairs of the French capital. His painting moved from Mexican and Spanish academic influences to those of Cézanne and then, under the direct impact of the painters themselves, of the Cubists. He saw a good deal of Picasso, Modigliani and Ilya Ehrenberg, exhibited his work in the galleries and salons, and was in general caught up in the aesthetic ferment of the School of Paris. He was thus in the position of many other artists who made up the Parisian *avant-garde* in the period before and after the First World War: that of a foreigner who had shed his provincial culture and submitted his talents to the most sophisticated and arduous refinements in Western art. He could very well have gone on to a career like Chagall's, say, making his art a synthesis of native memories and French style.

But Rivera's life and art took a completely different turn. To the entire Parisian generation of which he was a part, and not to Rivera alone, the First World War marked the end of something. Neither Cubism nor French *avant-garde* aesthetics as a whole ever again recovered the confidence and authority they had enjoyed before the war. For some—Rivera among them—the Russian Revolution, coinciding with the war, was an event of even greater importance. Whereas the war represented an appalling destruction of values, the revolution promised the creation of new possibilities, and in Rivera's case, the possibilities were felt all the more keenly because of obvious parallels between the Mexican Revolution and events in Russia.

"The Revolution which took possession of Diego Rivera and made him its painter," writes Mr. Wolfe, "was the Mexican Revolution not the Russian." Yet it was in Paris, under the influence of emotions excited by the Russian upheaval and the artistic ambitions generated by his own involvement in the French art scene, that Rivera came into possession of a point of view large enough to contain both these interests and his Mexican identity as well. In the formation of that point of view, his friendship with the French art historian Elie Faure was crucial. Faure provided Rivera with a sense of artistic possibility that was, both historically and aesthetically, far more comprehensive and socially ambitious than anything to be found in the ideas of the Cubists. He turned Rivera's attention away from easel painting to fresco, and sent him to Italy to see the great wall paintings of the masters. Rivera thus returned to Mexico in the early twenties by way of Italy, having been trained in the greatest art workshop in modern times, but already yearning for a completely different artistic task.

"Diego's return to Mexico and his contact with the Mexican Revolution," writes Mr. Wolfe, "was for him what the revolution itself was for his country—an experience in self-discovery, an enhancement of his appreciation of his native roots and autochthonous plastic sensibility." Mr. Wolfe, who, like Rivera, was deeply involved in the Mexican Communist movement in the twenties, provides a very detailed but always very readable and forthright account of just what this "experience in self-discovery" produced, artistically, politically, intellectually and in every sphere of the artist's personal affairs. Even if one cannot concur in the author's exalted estimate of Rivera's artistic accomplishments, the story is none the less a magnificent one, and Mr. Wolfe tells it well. His book is characterized throughout by an affection and generosity of spirit that is rare in critical literature deal-

Hilton Kramer was the editor of Arts Magazine *from 1956 to 1961. He is now at work on a study of twentieth-century painting and sculpture to be published by Doubleday-Anchor.*

Yorick's Song For The New Year

The old year has bled from a wound
I have imagined. The blood is made
physical in these streamers of
confetti, red, blue, white, green,
how gay they are! Twisting, sailing
in a new year's wind. The gaiety
they have achieved the gaiety
of death, the vicious grin of skulls
that every gentle face, or tortured
face, beams against death's dark.

Gilbert Sorrentino

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ing with artists whose careers have been as deeply enmeshed in political and ideological adventures as Rivera's.

The lengthy account Mr. Wofe gives of Rivera's work in Mexico and of his unhappy foray into the American scene, in the thirties, provides us with a clearer perspective not only of Rivera's particular accomplishments but of the kind of accomplishment it represented. Rivera's ambitions were of a kind that could only be fulfilled in a country which had not yet caught up with the advanced literacy and technology of the modern industrial state. (In this respect, Rivera's influence on American art, such as it was, was an accident of politics; it answered to nothing fundamental either in American culture as a whole or the American artist's attitude toward his own experience.) Yet the synthesis of indigenous culture with modern aesthetic and ideological programs that Rivera—and the whole Mexican mural movement — attempted, remains for many so-called "underdeveloped" countries today a pressing dilemma. The artists and intellectuals of these countries can be found in Paris, London and New York, brooding on the very problem Rivera was discussing with Elie Faure at the end of the First World War in Paris: the problem of making a cultural whole out of what history and technology have divided. To this problem Rivera's example has a far greater relevance than to anything happening in our own artistic affairs.

ARCHITECTURE

Walter McQuade

Alvar Aalto, the great Finn, has much to reveal to Americans at this juncture in matters of architectural tone and completeness. But he remains remote, a kind of contemporary legend off in that Scandinavian timber toyland from which at present only Danish designers seem to emerge. One of Aalto's architectural qualities has always been an unabashed, large-animal heft to his buildings; another, a feeling of easy craftsmanship and naturalness. American architects try for the heft, but seldom with naturalness, and too often with an abrasively crude sort of chic. The material is concrete, and the model is Le Corbusier, a deceptive one.

But perhaps Aalto would be even more elusive. He has always been subtle. His buildings combine heft and edge, sense and sensibility, without becoming compromises. He said some time ago, "Architecture — the real thing — is only to be found when man stands in the center." At this point in history, maybe Aalto is the center.

He is an odd architect in that he seems very willing to wait. In this country he has only one building, a large MIT dormitory built sixteen years ago, which he does not mention with his favorite work. It stands up well, however, after the sensations of the hour have faded. At the 1939 World's Fair there was no better design than his Finnish pavilion. As a high-school boy I remember being startled that a building could be at the same time so modern and so mellow. There are but few American designers who follow Aalto's lead. The best is probably Harry Weese, a young architect out of Chicago.

One reason why Aalto has not drawn further commissions on this continent is that he seldom comes here seeking them, and at home in Helsinki does not read letters or answer the telephone — although it is sometimes possible to get through to him by telegram. Amiable in person, he likes his informal privacy. His countrymen have raised him to a level of fame with Sibelius, but that doesn't bother him. It even carries privileges: several years ago he and a friend rowed across one of his favorite rural lakes and took an oar to a blatant new neon sign. There was not much fuss; the Finns apparently figure Aalto knows what he is doing.

He keeps busy enough; he has recently completed a number of significant commissions in Europe, most of which are shown in a very nice new picture book: *Alvar Aalto* (George Wittenborn, Inc., $16.75).

His essence is the same as it was in the 1920s, if his forms are not. Even in the thirties when, with Gropius and Le Corbusier, he was one of the leaders of the European functional movement, he was more flavorful than most because he never entirely let go of nature. He liked steel, but made his modern chairs of wood. He liked an "abstract" line, but his were often curved, seldom jagged. He was able to create impressive formal spaces, but seldom omitted the ingredient of geniality. The exploring, erring human mind was never quite rebuffed by his buildings.

After the war, when the other in-

While Seated in a Plane

On a kicked-up floor of cloud
a couch of cloud, deformed and fluffy;
far out, more celestial furniture — fat chairs

slowly puffing forth their airy stuffing.
On dream-feet I walked into that large
parlor on cool pearl — but found it far

between the restless resting places.
Pinnacles, detaching, floating from their bases,
swelled to turbulent beds and tables,

ebbed to ebullient chairs,
then footstools that, degraded,
flowed with the floor before I could get there.

One must be a cloud to occupy a house of cloud.
I twirled in my dream, and was deformed
and reformed, making many faces,

refusing the fixture of a solid soul.
So came to a couch I could believe,
although it altered

its facile carvings, at each heave
became another throne.
Neither dissolved nor solid, I was settled

and unsettled in my placeless chair.
A voluntary mobile, manybodied, I traded
shape for the versatility of air.

May Swenson

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dustrial architects began to stack the world with impersonal, remote buildings, Aalto gradually became annoyed with the functional movement he had served as an usher. He became vituperative about what he called "the inhuman dandy-purism of the cities . . . there is a propaganda-borne formalism pushing itself into the foreground. . . . Grown-up children play with forms and curves which they do not control. It smells of Hollywood." His own reaction in architecture against the smug perfectionism and structural dilettantism of the 1950s was not as violent as those of the great Le Corbusier, or the young "brutalists" who began throwing great chunks of concrete into architecture. Instead, he became more intricate but less formal. And today he still is impressed by nature's refusal to be standardized — in sites, in growing things, changing qualities of daylight or tenants—and goes on speaking these small irregularities in architecture. He exercises intense control over his designs, like a great violinist, but also commits himself so far into them that they have a lot of content and emotion. A number of his buildings have rather odd shapes, seemingly arbitrary, but are detailed down to the last lighting fixture not only to work well, but to please their users (and himself) with small favors as well as large.

The Wittenborn book goes all the way back to the beginning when, in 1927, Aalto won a competition for the tuberculosis hospital at Paimio — a hospital whose character has probably yet to be matched. It is hospitable, in a kindly way, without coziness, reassuringly impressive, anything but aseptic. Using this kind of language about buildings lays one open to the charge of fancy writing, but it is typical of Aalto's architecture that there are shades of characterization to it. It doesn't simply make socko impact.

Another example in this context is his Teachers College, Jyvaskyla. The interior spaces are ingratiating, and outdoors the group succeeds in matching the tranquil mood of a surrounding forest. Or the Imatra Church, a large tall church "room," divided into three chambers by soundproof walls which can be slid into hidden housings. The division of the church — which has not only devotional functions but many social activities — is expressed by three distinct sections of façade, two of them curved to receive the sliding walls. High windows admit daylight; slanted inside those windows are secondary windows; slatted to break up the daylight (and, perhaps, pick up the geometry of the church's handsome pipe organ). The roofs of the three sections are also vaulted separately; at the altar end, the space is at its narrowest and highest. The exterior is very white, and was intended to stand partly hidden by a thick grove of slender, tall trees; but nature betrayed Aalto here — most of the trees have died. The bareness of setting makes this plastic building almost too apparent, too bold — a little grotesque on the exterior.

The church's sliding walls are operated by electric motors; but in a crematorium Aalto designed in Sweden he refused to go along with the usual procedure for lowering the body down to the oven by means of an automatic platform which descends silently at the conclusion of the chapel service. No machines, he said, the living should carry away the dead.

One of the more withdrawn of Aalto's designs is a house built in the French countryside for the famous dealer, Louis Carré, a rather deliberate combination of elements which makes the house stand just a little aloof from its vernal site. It doesn't, in short, try to outdo nature; its seemingly arbitrary shapes suggest the complicated presence of a sophisticated man.

Here, as in all of Aalto's buildings, are many changes of level and direction, formidable textures, virtuoso passages of ceiling. But here also is that mysterious element in the very shape of almost all Aalto buildings which cannot be thoroughly apprehended or explained, but only felt. This is the battery-charge of human identity most often absent in conventional modern architecture, the unmistakable character of one architect. Corbusier has it; Mies van der Rohe has it; Aalto has it. He builds himself into his designs. If Frank Lloyd Wright's broad cape is to descend to any living architect, it probably should be Aalto who inherits it. But in all likelihood he would have it retailored into a casual tweed jacket.

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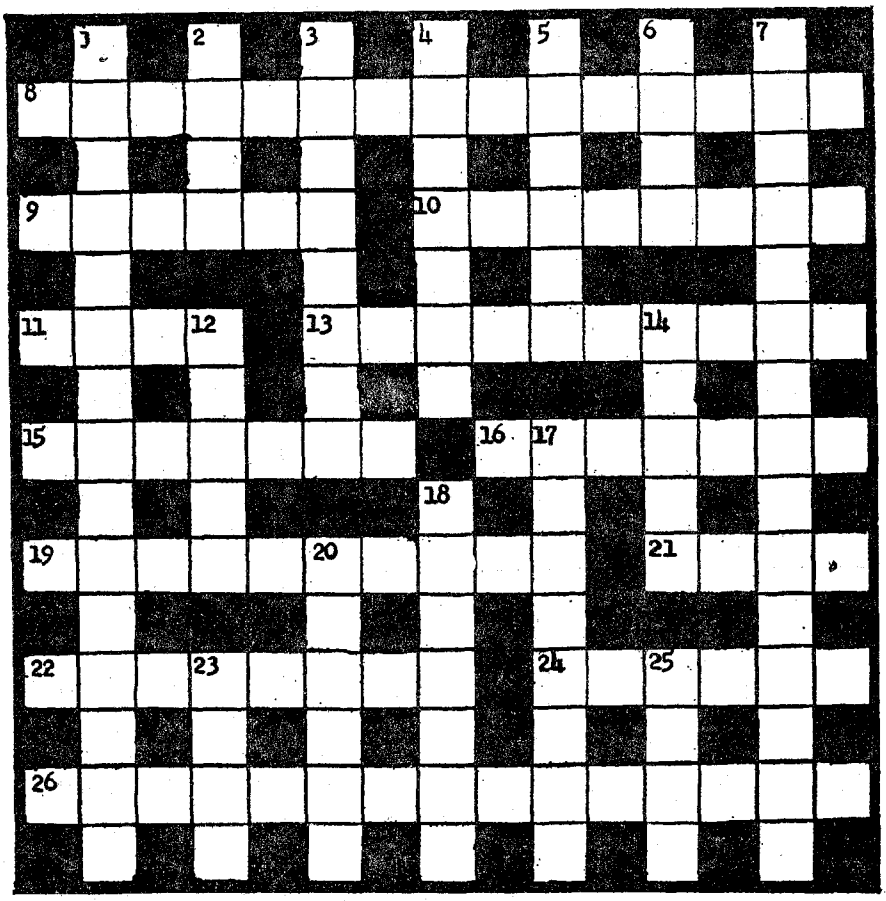
Crossword Puzzle No. 1039

By FRANK W. LEWIS



ACROSS:

8 This authority has a lot of power. (9, 6)
9 Not quite so pert as so dashing. (6)
10 Walked proudly with a certain amount of support. (8)
11 Poses, perhaps. (4)
13 Saw something like this? (10)
15 Might be called a slightly different sort of municipal officer. (7)
16 Tend in things to suggest calls to memory. (7)
19 Is your present car in need of repairs? They could only be expected to help with the woodwork. (10)
21 and 2 down Insects on vegetable excrescence? They should consider the other sex. (8)
22 Such a reference might start in the beginning. (8)
24 It's just a foreign word I have for something that moves me. (6)
26 They do their best to see that what is supposedly arranged in heaven isn't. (8, 7)

DOWN:

1. Taxidermists, chiropractors, neurologists and toxologists are all this. (15)
2 See 21 across
3 Acted to legally bar something with top speed. (8)
4 What retiring people might hope to enjoy. (7)
5 Not looking with favor on what might be in a chapter. (6)
6 Lots of it suggests where some of our money might go. (4)
7 It suggests quite the opposite of an express shipment. (7, 8)
12 Sink, when filled with water. (5)
14 Act in a fetching way? (5)
17 Not a hard grade to obtain, but not a popular class to be in. (4, 4)
18 This could be nourished by spring — and nourished satisfactorily, too, (4, 3)
20 Drink that should be difficult to obtain when coming out of a trance. (6)
23 General attraction? Not as a rule. (4)
25 What we do with medicine is the opposite of 14. (4)

SOLUTION TO PUZZLE NO. 1038

ACROSS: 1 Palpitate; 6 Raged; 9 Idiotic; 10 Ermines; 11 Theorbo; 12 Genteel; 13 and 17 across Flyweight; 15 Sesame; 18 and 1 down Flash point; 19 Intact; 22 Opined; 27 Escapes; 30 Wrestle; 31 Compeer; 32 and 25 across Baseless; 33 Mistrusts. DOWN: 2 Loiters; 3 Interim; 4 and 28 Arch of Triumph; 6 Romance; 7 Ginseng; 8 Desolated; 14 and 29 Loan sharks; 15 Spider web; 16 Eft; 17 Who; 20 Tickers; 21 Capital; 23 Primmer; 24 Numbers; 25 Esteem; 26 Stocks.

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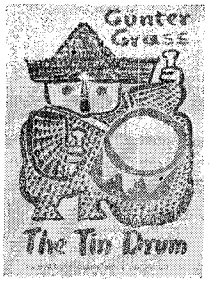

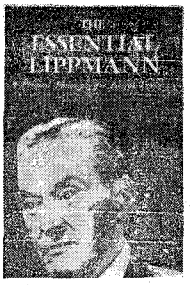

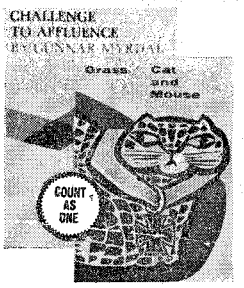

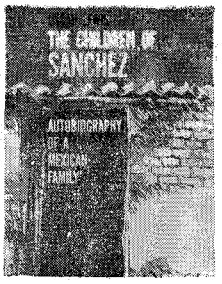

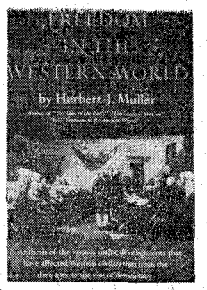

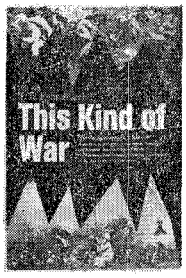

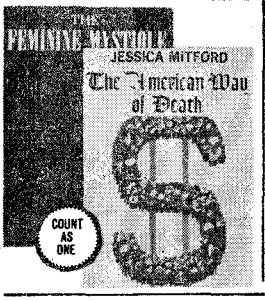

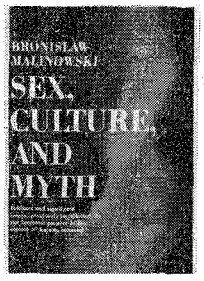

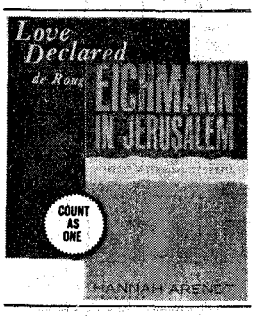

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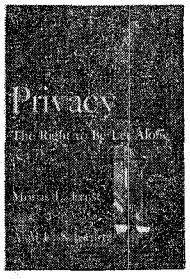

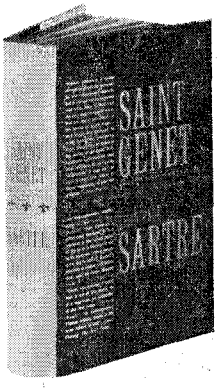

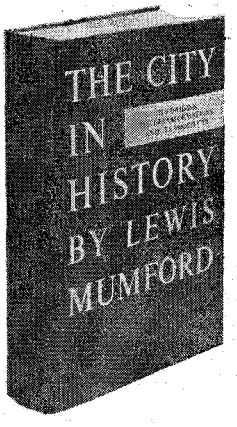

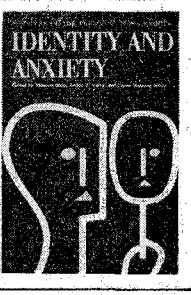

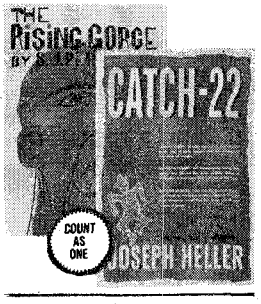

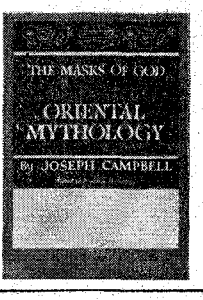

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